Calendar of AMS Meetings

THIS CALENDAR lists all meetings which have been approved by the Council prior to the date this issue of the Notices was sent to press. The summer and annual meetings are joint meetings of the Mathematical Association of America and the American Mathematical Society. The meeting dates which fall rather far in the future are subject to change; this is particularly true of the meeting dates which have been approved by the Council prior to the date this issue of the Notices was sent to press. First and second announcements of the meetings have appeared in earlier issues.

ABSTRACTS OF PAPERS presented at a meeting of the Society are published in the journal Abstracts of papers presented to the American Mathematical Society in the issue corresponding to that of the Notices which contains the program of the meeting. Abstracts should be submitted on special forms which are available in many departments of mathematics and from the office of the Society in Providence. Abstracts of papers to be presented at the meeting must be received at the headquarters of the Society in Providence, Rhode Island, on or before the deadline given below for the meeting. Note that the deadline for abstracts submitted for consideration for presentation at special sessions is usually three weeks earlier than that specified below. For additional information consult the meeting announcement and the list of organizers of special sessions.

<table>
<thead>
<tr>
<th>MEETING #</th>
<th>DATE</th>
<th>PLACE</th>
<th>ABSTRACT DEADLINE</th>
<th>ISSUE</th>
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<tr>
<td></td>
<td>(90th Annual Meeting)</td>
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<tr>
<td>810</td>
<td>April 6–7, 1984</td>
<td>Notre Dame, Indiana</td>
<td>FEBRUARY 1, 1984</td>
<td>February</td>
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<tr>
<td>811</td>
<td>April 13–14, 1984</td>
<td>Richmond, Virginia</td>
<td>FEBRUARY 6, 1984</td>
<td>February</td>
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<tr>
<td>812</td>
<td>June 29–July 1, 1984</td>
<td>Plymouth, New Hampshire</td>
<td>APRIL 23, 1984</td>
<td>June</td>
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<tr>
<td>813</td>
<td>August 16–19, 1984</td>
<td>Eugene, Oregon</td>
<td>JUNE 5, 1984</td>
<td>August</td>
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<td></td>
<td>November 2–3, 1984</td>
<td>Minneapolis, Minnesota</td>
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<td>November 9–10, 1984</td>
<td>San Diego, California</td>
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<td>January 9–13, 1985</td>
<td>Anaheim, California</td>
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<td>(91st Annual Meeting)</td>
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<td></td>
<td>April 12–13, 1985</td>
<td>Tucson, Arizona</td>
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<td>January 7–11, 1986</td>
<td>New Orleans, Louisiana</td>
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<td></td>
<td>January 21–25, 1987</td>
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<td>(93rd Annual Meeting)</td>
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Other Events Sponsored by the Society


April 2–5, 1984, Symposium on Pseudodifferential Operators and Fourier Integral Operators with Applications to Partial Differential Equations, University of Notre Dame, Notre Dame, Indiana. This issue, page 71.


June 10–August 18, 1984, Joint Summer Research Conferences in the Mathematical Sciences, Bowdoin College, Brunswick, Maine. This issue, page 77.

July 8–21, 1984, AMS-SIAM Summer Seminar on Nonlinear Systems of PDE in Applied Mathematics, College of Santa Fe, Santa Fe, New Mexico. This issue, page 78.

July 16–August 3, 1984, AMS Summer Research Institute on Geometric Measure Theory and the Calculus of Variations, Arcata, California. This issue, page 79.

Subscribers' changes of address should be reported well in advance to avoid disruption of service: address labels are prepared four to six weeks in advance of the date of mailing. Requests for a change of address should always include the member or subscriber code and preferably a copy of the entire mailing label. Members are reminded that U. S. Postal Service change-of-address forms are not adequate for this purpose, since they make no provision for several important items of information which are essential for the AMS records. Suitable forms are published from time to time in the Notices (e.g. June 1980, page 378). Send change of address notices to the Society at Post Office Box 6248, Providence, RI 02940.

Notices is published eight times a year (January, February, April, June, August, October, November, December) by the American Mathematical Society at 201 Charles Street, Providence, RI 02904. Second class postage paid at Providence, RI and additional mailing offices. POSTMASTER: Send address change notices to Membership and Sales Department, American Mathematical Society, Post Office Box 6248, Providence, RI 02940. Publication here of the Society's street address, and the other information in brackets above, is a technical requirement of the U. S. Postal Service. The street address should never be used by correspondents, unless they plan to deliver their messages by hand.

Members are strongly urged to notify the Society themselves of address changes (in the manner described above), since (as explained above) reliance on the postal service change-of-address forms is liable to cause delays in processing such requests in the AMS office.
Volume 31, Number 1, January 1984

2 Addendum to Survey of American Mathematical Research Journals

3 There is no room to spare in four-dimensional space, Michael H. Freedman

7 News and Announcements

11 Queries

12 Letters to the Editor

19 NSF News & Reports

23 Future Meetings of the Society
   Louisville, January 25–28, 23
   Mathematical Sciences Employment Register, 43
   Notre Dame, April 6–7, 71
   Richmond, April 13–14, 75
   Joint Summer Research Conferences, 77
   1984 AMS-SIAM Summer Seminar, 78
   AMS Summer Research Institute, 79
   Invited Speakers and Special Sessions, 80

82 Special Meetings

87 New AMS Publications

89 Miscellaneous
   Personal Items, 89; Deaths, 89;
   Visiting Mathematicians (Supplement), 89
   Erratum to the 1983–1984 Combined Membership List, 90

91 AMS Reports and Communications
   Recent Appointments, 91;
   Reports of Past Meetings: 1983 Summer Research Institute, 92; Fairfield, 92

94 Advertisements
Addendum to
Survey of American Mathematical Research Journals

The November 1983 issue of the Notices (Vol. 30, no. 7, pp. 715–719) contained the results of the Survey of American Mathematical Research Journals which was run by the Society. Because of a transcription error three journals were inadvertently left out of the survey. The data on these journals are presented below. Reprints of the survey should be available soon, and will include this additional information.

Primary Typeset Journals

<table>
<thead>
<tr>
<th>Journal/Publisher</th>
<th>1982 list price, $US</th>
<th>pages in 1982</th>
<th>cents/1000 char</th>
<th>Circulation</th>
<th>Requested back volumes</th>
<th>Back volumes</th>
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<tr>
<td>Advances in Appl. Math*</td>
<td>66.00</td>
<td>488</td>
<td>2980</td>
<td>4.5</td>
<td>NG</td>
<td>P,**</td>
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<td>Academic Press</td>
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<td>SIAM J. on Computing</td>
<td>84.00</td>
<td>789</td>
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<td>2.5</td>
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<td>Soc. for Indust. &amp; Appl. Math</td>
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</tbody>
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* These costs were calculated as if the entire issue were typeset to the specifications of the Research section. The Book Reviews sections, less than 1% of the total pages, were actually typeset in a smaller size.

** For information on microfilm, please contact the publisher.
There is no Room to Spare in Four-Dimensional Space

by Michael H. Freedman

How much space is there in a phone booth? Enough for eight college students? Possibly for 24 if we are a little rough imbedding them? Packing a suitcase, we see the same phenomenon. If we don't require our shirts to be differentially imbedded we can get more in—isn't that a great observation!

Room is also the issue in manifold topology. A curiosity, conspicuous to the interested outsider, was that the increased understanding of manifolds, explosive in the years 1956 through 1968, skipped over dimension four (and to a certain extent dimension three) and went directly to the "high-dimensional" case $M^n, n \geq 5$. Whenever something conspicuous occurs, one needs a short answer to: why? The need is social and psychological: your friends want to know what is happening and don't want to be bored by a long and confusing answer. Which is all to the good. Things would quickly get out of hand if we were willing to listen to complicated reasoning.

There is more room to work when the dimension of the manifold is greater than or equal to five. That is the short answer; let's unfold it a little. Consider a closed manifold (that is, compact and without boundary) $M^{4k}$ of dimension $4k$. (A general discussion would distinguish cases according to the dimension's parity mod 4.) One can imagine the various submanifolds that can be found inside $M$: circles, surfaces, 3-manifolds, on up to $(4k - 1)$-manifolds. These and their intersections tell a lot about the topology of $M$; they provide the information an algebraic topologist sees in the cohomology ring $H^*(M)$. Submanifolds of dimensions $j$ and $4k - j$ are "dual" in that they tend to intersect in points. The $2k$-dimensional submanifolds are dual to themselves and prove to be the most resistant to modification. Below the middle dimension, cutting and gluing (surgery) is easily performed to manipulate the homology and cohomology groups. Poincaré duality, a fundamental correspondence between the submanifolds in dual dimensions, forces a corresponding change in dimensions greater than $2k$.

To understand a manifold of dimension $4k$, we must understand how its submanifolds of dimension $2k$ intersect. By general position we assume they meet in points. (Consider for this that submanifolds are locally modeled on sub-vector-spaces and that two sub-affine-spaces of dimension $2k$ in a vector space $V^{4k}$ will in general (generically!) share exactly one point.) In the presence of orientations these points are counted with a sign to yield an integer $\ell$. A key step in further understanding the topology of $M$ is to determine whether the two submanifolds $A^{2k}$ and $B^{2k}$ can actually be moved into a position in which they intersect in exactly $\ell$ points. That is, can algebraically cancelling pairs of opposite sign (point+, point-) be geometrically cancelled?

The essential idea here is to find a 2-dimensional disk imbedded in $M$, the "Whitney disk," to guide the cancellation:

![Diagram](image)

The point is that whatever value $k$ assumes we will always be concerned with eliminating extra points of intersection, and the mechanics of this requires finding suitable 2-disks—the dimension of what we are looking for is two regardless of how large or small $k$ is.

If $k$ is greater than 1 the problem of finding the Whitney disk $D^2$ is straightforward: homotopy information plus general position. This is typical of the beautiful agreement between topology and algebra in dimensions greater than or equal to five. When $k = 1$ we must think about placing a disk in a 4-manifold. It may try to cross itself like an arc in the plane:

![Diagram](image)

It may try to intersect the surfaces $A^2$ and $B^2$ where it should not:

![Diagram](image)

and a less obvious, but real, framing problem may develop in the disk's normal bundle.
The problem of producing Whitney disks arises in trying to adapt the high-dimensional classification theory to dimension four. Roughly, existence questions depend on surgery, and uniqueness depends on $h$-cobordism type theorems. The proofs of both require finding Whitney disks in rather special situations. Can they be found? The answer is now largely (?) known. It is yes, or at the very least quite often, if one is speaking in the topological category. It is very often no in the smooth category.

The answer to this basic question depends on this strangely technical point. Are we considering our manifold to be smooth, that is, provided with an atlas of coordinate charts, $(R^4_x)$, satisfying the usual requirement that on an overlap of two charts the coordinates of one are infinitely differentiable functions on the other, and are we looking for Whitney disks which are smooth submanifolds, that is, covered by chart pairs $(R^2_{x_1}, vect-space, R^4_{\beta})$

belonging to the atlas? The alternative is to take only the point-set-topological structure: a locally Euclidean, metrizable space as the definition of this strangely technical point. Are we considering the disk to be useful in cancelling intersections.)

Why can we find these disks topologically but not smoothly (even if we are given a smooth manifold and look for Whitney disks which are smooth submanifolds, that is, covered by chart pairs

$$\begin{array}{c
+1 \quad 0 \\
+1 \quad +1 \\
0 \quad +1
\end{array}$$

(here the $(i,j)$-entry is the number of intersection points between surfaces $A_i$ and $A_j$ which belong to the basis for the second homology $H_2(M^4, Z)$).

The history of ideas leading to this theorem is remarkable. Hodge theory has long been a beautiful bridge between topology and analysis in which a cohomology class (the topological object) is uniquely realized by a differential form which is a critical point of the appropriate energy functional. The modern formulation
of electromagnetism (Maxwell's equations) is simply an indefinite-metric version of Hodge theory. To understand weak interactions in the same general mathematical setting, a nonabelian version of Hodge theory was developed with the Lie group SU(2) replacing U(1) (=circle), the abelian group of internal symmetries arising in electromagnetism. In this theory, one searches for solutions of the self-dual Yang-Mills equation \( F_A = F_A^* \). For manifolds satisfying the hypothesis of the theorem, the space of solutions (modulo a natural "gauge"-equivalence) \( M \) is analyzed. It is found that \( M \) is 5-dimensional and can naturally be completed to a compact manifold \( \hat{M} \) (with certain understandable singularities) by attaching a copy of \( M^4 \) at the "infinity" or end of \( M \). By conventional topological arguments, this bounding of \( M \) by \( \hat{M} \) constrains the topology of \( M \) and ultimately leads to Donaldson's conclusion.

\[ M = N \# S^2 \times S^2 \]

\( M \) may be thought of as homeomorphic to a union \( M = N^- \cup S^2 \times S^2^- \), where the minus sign signifies that the interior of a small closed ball has been removed from the space. A lovely feature of this decomposition is that it is possible to produce a bizarre inclusion \( j : S^2 \times S^2^- \to S^2 \times S^2 \) such that \( j(S^2 \times S^2) \) has a neighborhood which is diffeomorphic to a neighborhood of \( S^2 \times S^2^- \) in \( M \). Consider the complementary smooth manifold \( V = S^2 \times S^2 - j(S^2 \times S^2^-) \).

**Step 2.** Standard methods in algebraic topology show that algebraic invariants do not distinguish \( V \) from \( R^4 \). The new proper-h-cobordism theorem is used to construct a homeomorphism from \( R^4 \) to \( V \).

**Step 3.** We claim that \( V \) cannot be diffeomorphic to \( R^4 \) and thus qualifies as a "fake \( R^4 \)." We assume \( V \) is diffeomorphic to \( R^4 \) and will quickly see that this leads to a contradiction. \( R^4 \) contains the family of round 3-spheres of integer radii. If \( V \) is diffeomorphic to \( R^4 \) it will likewise contain a family of smoothly imbedded 3-spheres marching off to infinity. The diffeomorphism mentioned at the end of Step 1 transfers some terminal collection of these 3-spheres into \( M \) where they will also be smoothly imbedded. Now the manifold \( N \), realizing the intersection form \( Y \), can be reconstructed by cutting along one of these three 3-spheres and gluing a 4-ball into the resulting hole. The important point is that since the 3-sphere along which we cut is, from our hypothesis, smoothly imbedded, the result of the construction \( N \) will also have a smooth structure. But this implies a general procedure, entirely within the world of closed, smooth, simply-connected 4-manifolds, for destabilizing an intersection form, i.e., for constructing a manifold with form \( Y \) given one with intersection form

\[ X = \begin{bmatrix} Y & 0 \\ 0 & 1 \end{bmatrix}, \]

then \( M \) has a similar decomposition as a topological connected sum \( M = N \# S^1 \times S^1 \). This means \( M \) is homeomorphic to the result of tubing some manifold \( N \) (with intersection form \( Y \)) to \( S^2 \times S^2 \).

\[ N \quad S^2 \times S^2 \]

This procedure, when applied to the standard examples of smooth 4-manifolds (i.e. the complex surfaces), would be sufficient to construct a closed, smooth, simply-connected 4-manifold with intersections representing a great variety of peculiar definite integral bilinear forms. On the other hand, Donaldson tells us that only the \( \pm \) "identity" forms may arise in the smooth case.
This article is the seventh in the series of Special Articles published in the Notices. Its author, Michael H. Freedman, is a professor of mathematics at the University of California, San Diego. He received his Ph.D. from Princeton University in 1969, with a thesis titled "Surgery", written under the supervision of William Browder.

The series of Special Articles was created to provide a place for articles on mathematical subjects of interest to the general membership of the Society. The Editorial Committee of the Notices is especially interested in the quality of exposition and intends to maintain the highest standards in order to assure that the Special Articles will be accessible to mathematicians in all fields. The articles must be interesting and mathematically sound. They are first refereed for accuracy and (if approved) accepted or rejected on the basis of the breadth of their appeal to the general mathematical public.

Items for this series are solicited and, if accepted, will be paid for at the rate of $250 per page up to a maximum of $750. Manuscripts to be considered for this series should be sent to Ronald L. Graham, Associate Editor for Special Articles, Notices of the American Mathematical Society, Post Office Box 6248, Providence, Rhode Island 02940.

References


Chern and Erdős
Awarded Wolf Prize

The Wolf Foundation award for the promotion of science and art for the benefit of mankind has been announced for 1983. The prize for mathematics is $100,000.

The prize is to be shared jointly by Shiing-Shen Chern, of the University of California, Berkeley, and Paul Erdős of the Hungarian Academy of Sciences. The citations follow:

Shiing Shen Chern has been the leading figure in global differential geometry. His earlier work on integral geometry, especially on the kinematic formula, was the source of most later work. His ground-breaking discovery of characteristic classes (now known as Chern classes) was the turning point that set global differential geometry on a course of tumultuous development. The field has blossomed under his leadership, and his results, together with those of his numerous students, have influenced the development of topology, algebraic geometry, complex manifolds, and most recently of gauge theories in mathematical physics.

Paul Erdős is one of the most prolific mathematicians of all times. His elementary proof of the prime number theorem (jointly with Atle Selberg) came after many a famous mathematician had pronounced such a proof impossible. The field of combinatorics owes its very existence to his work. His ingenious applications of probabilistic methods to existence questions has enabled him and those who followed him [to] obtain results well beyond explicit computation. His partition calculus in set theory (partly in collaboration with Richard Rado) has created a new branch of mathematics, at the intersection between mathematical logic and set theory. Two generations of mathematicians world-wide have benefited from his example and stimulation.

Debreu Awarded Nobel Prize
in Economic Science

Gerard Debreu of the University of California, Berkeley, was awarded the 1983 Nobel Memorial Prize in Economic Science. The amount of the award is approximately $190,000.

Debreu, who has been Professor of Economics at Berkeley since 1962, received a D.Sc. in mathematics from the University of Paris in 1956 and was an associate professor at Yale University, 1955 to 1960. He has held fellowships and visiting appointments at many universities, including the Catholic University of Louvain, the University of Canterbury and Cambridge University, and has held fellowships at the Center for Advanced Study
in the Behavioral Sciences and Centre National de la Recherche Scientifique. He was president of the Econometric Society in 1971 and a fellow of the American Academy of Arts and Sciences.

Mathematical economists who have received the Nobel Economics Prize since it was first awarded in 1969 include Ragnar Frisch (Norway) and Jan Tinbergen (Holland) in 1969, Paul A. Samuelson (U.S.) in 1970, Kenneth J. Arrow (U.S.) in 1971, Wassily Leontief (U.S.) in 1973, Tjalling Koopmans (Holland/U.S.) and Leonid Kantorivich (U.S.S.R.) in 1975, Herbert A. Simon (U.S.) in 1978, and Lawrence R. Klein (U.S.) in 1980.

Atiyah Knighted

Michael Francis Atiyah, Royal Society Research Professor, Mathematics Institute, University of Oxford, was made a Knight Bachelor in the Queen’s Birthday Honours list last June.

Sir Michael, who received a Fields Medal in 1966, was a member-at-large of the AMS Council from 1970 to 1972, Colloquium Lecturer of the Society in January 1973, and President of the London Mathematical Society in 1976. In 1978 he was elected to the U.S. National Academy of Sciences, Section of Mathematics.

1983-1984 Congressional Fellow

Charles G. Bird, a research scientist at the General Motors Research Laboratories (GMR), has been selected as a 1983-1984 Congressional Science Fellow.

Bulletin of the AMS

At the joint meeting in November 1983 of the Executive Committee of the Council and the Board of Trustees, it was decided that (as a cost-saving measure) the Bulletin of the American Mathematical Society would become a quarterly publication. The Bulletin, which is a privilege of membership, will now be published in January, April, July and October. This change is being implemented beginning with the 1984 subscription year. Because this change occurred late in the production schedule, the January 1984 issue may arrive a week or so later than AMS members would normally expect to receive it.

Under the terms of the fellowship, Bird, of Harrison Township, Michigan, will serve for one year in Washington, D.C. as a special legislative assistant on the staff of a member of the U.S. Congress or a congressional committee.

He is a staff research scientist in the GMR Mathematics Department. His fellowship appointment is sponsored jointly by AMS, MAA, and SIAM. It is one of thirty similar fellowships supported by scientific societies in a program administered by the American Association for the Advancement of Science.

Bird’s research interests are in the area of game theory and its applications in public policy analysis. As a member of the GMR staff, he has used game theory to analyze fuel economy constraints, import restrictions and health care costs. He has also developed mathematical models for forecasting automobile sales.

He has B.S., M.S., and Ph.D. degrees in mathematics from Carnegie-Mellon University in Pittsburgh. He received his doctorate in 1973, and thereafter served as assistant professor in mathematics at Washington State University, Indiana University, and the University of Georgia before joining General Motors in 1977. He is a member of SIAM and of the Operations Research Society of America.

Ernest O. Lawrence Awards

In 1959, the United States Department of Energy (then AEC) established the Ernest O. Lawrence Awards, to be awarded annually. Each winner receives a citation, a medal and $5,000.

In 1983, five scientists received Lawrence Awards; one of them was given for a discovery in mathematics to Mitchell Feigenbaum for his discovery of the period-doubling route to chaos, which has furthered the understanding of a wide variety of nonlinear physical phenomena in fields as diverse as turbulence, solid-state physics, plasma physics, chemical kinetics and population biology.
AMS Trustees Honor
Two More Twenty-year Employees

At its meeting in November 1983, the Board of Trustees of the Society adopted the following resolution:

The Trustees take special notice of two employees who have completed twenty years of service to the Society, and tender their deep appreciation to JOSEPHINE FARIA and EDITH KREKORIAN. These two employees bring to twelve the number who have been with the Society for more than twenty years. The Trustees are pleased and delighted that so many AMS employees have shown such a degree of dedication to the work which they perform for the Society. They wish all of them well and hope that they find their futures at the AMS at least as personally satisfying as the first twenty or more years.

This kind of announcement has become almost an annual event. See the February 1983 issue of the Notices, pages 157 and 158, for the names of the ten other employees of the Society previously so honored.

JOSEPHINE FARIA joined the staff of the Society in May 1960. She was hired to work for six months in the Editorial Department on the MR Index. As work on the Index neared completion, Jo began doing secretarial work for Ellen Swanson. She continued as Ellen’s secretary for ten years during which she began handling the abstracts for the Notices. In 1970 Jo left the AMS to have her second child, returning in a part-time capacity after two and one-half years. In 1976, she began working full time again and has worked exclusively on the abstracts ever since, through the division of the abstracts into a separate journal to the current computerization of many of the record-keeping aspects of them.

EDITH KREKORIAN came to the AMS in April 1963 to work in the Sales Department filing orders. In 1964, she originated the book sales at our annual meetings. From there, she worked on pre-coding for a new computer which took approximately two years. After the Society moved to its South Main Street office, she took over Purchasing. At that time purchasing only entailed supplies; but as time went on, her job became more and more involved. Currently, she purchases almost everything from paper to million-dollar machinery. She also maintains the records of all of these purchase orders. She is now also in charge of buildings and grounds, and was responsible for overseeing the construction of the warehouse and bindery from the ground up.

International Mathematical Union

The funds of the Special Development Fund of the IMU, which go unreduced to mathematicians from developing countries, are used primarily for travel grants to young mathematicians, to make it possible for them to participate in International Congresses of Mathematicians. The Executive Committee of IMU elects an international committee to distribute the grants. The Special Development Fund is supported by private donations. Donations can be sent at any time and in any convertible currency, to the following accounts:

Schweizerische Kreditanstalt
Stadtfiliale Zürich-Rigiplatz
Universitätstrasse 105
CH-8033 Zürich, Switzerland
Account number 0862-656208-21

Kansallis-Osake-Pankki
Aleksanterinkatu 42
SF-00100 Helsinki 10, Finland
Account number 100020-411-USD-5705 FR.

The next goal is to collect money for travel grants for the 1986 International Congress of Mathematicians in Berkeley.

OLLI LEHTO, Secretary, IMU

IMA Board Members

The Institute for Mathematics and its Applications, Minneapolis, announces that James Glimm

Alfred Tarski, 1902–1983

Alfred Tarski died on October 26, 1983, at the age of 81. He was a member of the Society for forty-three years.

Tarski was born in Warsaw on January 14, 1902. He received a Ph.D. degree from the University of Warsaw in 1923 and came to the United States in 1939 as a research associate in mathematics at Harvard University. He was a Guggenheim Fellow in 1941, 1942, 1955, and 1956 and a member of the Institute for Advanced Study in 1942. In 1942 he moved to the University of California, Berkeley, as lecturer and later served as associate professor and professor of mathematics. In 1968 he retired as Professor Emeritus.

From 1944 to 1946 Tarski was president of the Association for Symbolic Logic. He served the AMS as a member-at-large of the Council, 1948–1950, and was the Colloquium Lecturer at the Summer Meeting in East Lansing in 1952. In 1965 he was elected to the National Academy of Sciences.
of New York University, Elliott Lieb of Princeton University, Karen Uhlenbeck of the University of Chicago, and Shmuel Winograd of IBM T. J. Watson Research Center have been elected to three-year terms on the Board of Governors effective January 1984. They will replace Felix Browder, Ronald Graham, Shizuo Kakutani, and Stephen Smale whose terms expire at the end of 1983. Continuing members of the Board are Donald Burkholder, Wendell Fleming, Frederick Gehringer (chairman), Joseph Keller, Daniel Kleitman, and Jürgen Moser.

News Release

Academy of Sciences of Latin America

As a consequence of an organizational meeting held at the Academy of Sciences of the Vatican in 1983, the Academy of Sciences of Latin America has been founded.

The Brazilian biologist Carlos Chagas, President of the Academy of Sciences of the Vatican, has been elected President of this new Academy.

The following Latin American mathematicians have been elected to a membership in the Academy: Luis A. Santaló (Argentina), honorary member; Alberto P. Calderón (Argentina), Rolando B. Chuaqui (Chile), Leopoldo Nachbin (Brazil), and Maurício M. Peixoto (Brazil), members.

NAS Exchanges with U.S.S.R. and Eastern European Academies

The National Academy of Sciences (NAS) invites applications from American scientists who wish to make visits beginning during the period January 1, 1985 through December 31, 1985 in the U.S.S.R., Bulgaria, Czechoslovakia, the German Democratic Republic, Hungary, Poland, Romania and Yugoslavia. Long-term research visits of five to twelve months' duration are encouraged, particularly those where contact with colleagues in the other country has already been established.

Applicants must be U.S. citizens and have a doctoral degree or its equivalent by the time of the intended visit in mathematics; the physical, biological, or engineering sciences; social or behavioral sciences; or biomedical sciences. For the purpose of the exchange programs, emphasis in the social and behavioral sciences is placed on those which are oriented toward empirical and quantitative analysis and which focus on the analysis of individual and group behavior. All necessary expenses will be met by the NAS and the foreign academy, including reimbursement for salary lost up to a predetermined maximum and expenses for accompanying family members on visits of five months or more.

Requests for applications should reach the National Academy of Sciences not later than February 17, 1984. Deadline for receiving completed applications is March 1, 1984; applications must be postmarked by February 27, 1984. Address application requests to: National Academy of Sciences, Office of International Affairs, USSR/EE, 2101 Constitution Avenue, N.W., Washington, DC 20418. For further information: 202-334-2644, or 202-334-2645.

Discrete Mathematics in College Curriculum

The Mathematical Association of America (MAA) recently appointed a Panel on Discrete Mathematics in the First Two Years. Computer Science and the pervasive use of algorithms to solve important problems in numerous fields have created the need for students to study more logic, combinatorics, and such discrete structures as matrices, graphs, and semigroups. Computers have also lessened the need for students to do repetitive calculations of integrals and derivatives. Symbol manipulation by computers has become a reality. The charge to the panel is to make suggestions as to curricular changes, including the inevitable adjustment of the calculus curriculum. Members of the panel include representatives of the MAA, the Association for Computing Machinery (ACM) and the American Society of Engineering Education (ASEE). The work is being funded by the Alfred P. Sloan Foundation.

The panel is particularly interested in the impact of a scheme in which discrete mathematics would be taught for the equivalent of one year and the calculus condensed and taught for the same period of time. There will be an attempt to define at least two prototypes. One would integrate the two subjects into a two-year sequence with topics from calculus and discrete mathematics interspersed. The other would define two one-year courses, possibly independent, one in discrete mathematics and one in calculus.

The panel invites the views of the community. Please forward same to Professor Martha Siegel, Department of Mathematics and Computer Science, Towson State University, Towson, Maryland 21204.

MAA News Release

Erratum

In the article on Nonacademic Employers of Mathematicians by D. H. Bailey (November 1983 Notices), an employer's name was misspelled. The last entry under Massachusetts on page 758 should be: Verbeex (5) 2 Oak Park, Bedford, MA 01730.
Queries

294. Peter Lyall Easthope (3760 72nd St., RR1 Delta, B. C. V4K 3N2, Canada). What is the analogous result for 3×3 matrices of the following?

If \( M = 2 \times 2 \) matrix,
\( I = 2 \times 2 \) identity matrix,
\( |M| = \det M \),
\( \text{tr} M = \text{trace} M \),
\( I_1 = \frac{1}{2}(\text{tr} M + ((\text{tr} M)^2 - 4|M|)^{1/2}) \),
\( I_2 = \frac{1}{2}(\text{tr} M - ((\text{tr} M)^2 - 4|M|)^{1/2}) \),
\( I_4 = ((\text{tr} M)^2 - 4|M|)^{1/2} \),
then
\[ M^n = \frac{1}{2}(I_1 + I_2)I + \frac{I_1 - I_2}{2I_4}(M - |M|M^{-1}). \]

This form of the result appears to be necessary for an application in continuum mechanics.

295. Peter Flor (Institut für Mathematik, Der Karl-Franzens-Universität Graz, Brandhofgasse 18, Austria). A recent paper of K. D. Magill, Jr., contains the theorem stating that if a homeomorphic mapping of a Euclidean space onto itself arises as the composition of two continuous self-maps of that space, then those factors are homeomorphisms as well. The author cites as a reference the paper Schützenberger groups of \( H \)-classes containing odd degree polynomials, by himself and S. Subbiah, in Semigroup Forum 11 (1975), 49–78. Does anyone know an earlier reference to this beautiful property of Euclidean space? It might have been known to L. E. J. Brouwer since it follows rather easily from his theorem on the “invariance of domain” (a subset of Euclidean space is open if it is homeomorphic to the whole space).

Responses

The editor would like to thank all those who sent in replies.

Letters to the Editor

José Luis Massera

Seeking the release from prison of Professor José Luis Massera, a delegation representing the international scientific community visited Uruguay during the second week in November. Members of the delegation were Professor Javier Gonzalez of the University of Mexico City, Professor Jair Koiller of the University of Rio de Janeiro, Professor Bernard Prum of the Sorbonne and myself. I should characterize the trip as more successful than we expected, but less successful than we hoped. While we were not able to see Professor Massera, we did meet with Colonel Frederico Ledesma, President of the Supreme Military Tribunal. Colonel Ledesma assured us that Massera’s sentence will be reviewed early in 1984 and that there is a good chance that his sentence will be reduced to the eight years already served.

The American Mathematical Society, as well as the mathematical societies of many other countries, special committees and groups, 24 Nobel Laureates, members of the national academies of many nations and individual mathematicians from the Americas, Europe, the Soviet Union and China, has worked for many years on behalf of Professor Massera, a distinguished mathematician and founder of the Uruguayan school of mathematics. Professor Massera, now 68 years old, was secretary-general of the Communist party of Uruguay and a member of the parliament of Uruguay before the military takeover in 1973. In recent years he has been awarded honorary doctorates by universities in Nice, Pisa, Rome, Havana, Berlin, and Mexico, among others; he has been offered positions at leading universities in several countries.

The delegation which visited Montevideo stressed scientific and humanitarian considerations with the representatives of the political parties, with the Uruguayan government officials, with student and labor leaders and with the press. Particularly receptive was the Uruguayan Commission on Human Rights, which has only recently begun to try to work on human rights issues within Uruguay. The United Nations Commission on Human Rights has also communicated with the Uruguayan government regarding Professor Massera.

Members of the delegation believe that it is very important that over the next few months the Uruguayan authorities hear constantly about Professor Massera from his mathematical colleagues and from their governments. It is our impression that strong representations on behalf of Massera, on scientific and humanitarian grounds, from the United States government would be particularly useful. We suggest that all mathematicians interested in securing Professor Massera’s freedom write to Uruguayan President Alvarez and to Colonel Ledesma, but also to their own governments. U.S. Secretary of State George Shultz has in the past expressed a particular interest in the human rights of academics (since he is himself a former academic); I suggest that mathematicians write to him about Massera (U.S. Department of State, Washington, D.C. 20520).

Mary W. Gray
American University

International Congress of Mathematicians

It is gratifying for organizers to find out in the report of the Chairman of the U.S. National Committee for Mathematics positive opinions about the ICM in Warsaw (see October 1983 Notices, pages 571–573). I was particularly happy to see the statement that scientifically the Congress was a success, though, I realize that the success was not a full one, due mainly to a very visibly reduced Western participation and a comparatively higher percentage of absentees among the invited lecturers. Professor Mostow, in his report, marked with a dot only 23 absentees—with one mistake—on the list of all 145 invited speakers who accepted the invitation, while the correct number is 35, hence considerably higher. Also, there were more than 14 speakers from the U.S. whose lectures had to be cancelled.

However, these unfortunate facts did not have a wrecking effect to the Congress. This was due to the following circumstances, I believe.

Thirteen plenary speakers attended the Congress, all from the U.S. and U.S.S.R.

Participation from Eastern European countries was considerably higher than in Helsinki. Due to vigorous efforts of the U.S.S.R. National Committee, the participation from this country was high: 283 mathematicians of a high average caliber. The attendance from other countries though reduced was by far not negligible.

One could dwell on the reasons behind the reduced Western participation. Perhaps the atmosphere created around the Warsaw Congress after the imposition of martial law in Poland was the main factor. A lack of any coordination with other meetings due to the postponement of the Congress and the difficulties with receiving travel support cannot be disregarded.

In particular, I am convinced that the block placed on federal travel grants influenced the attendance from the U.S. In comparison with the Helsinki Congress it was percentagewise reduced more than that from France, Japan, Federal Republic of Germany or United Kingdom. It is clear that the participation of the U.S.
mathematicians in ICM-78 would not have been that high if not for the support of the NSF through a special travel grant and through research grants. Both these sources were not available in the case of our Congress.

Under these circumstances, the presence in Warsaw of about 120 U.S. mathematicians, among them 30 invited speakers, was indeed high and gratifying to the entire Congress, in particular to the organizers.

This concerns also the invited speakers from the U.S. I can only regret and apologize that we were not able to offer full support to all invited lecturers because I am sure this would reduce the number of absentees.

I am in full agreement with Professor Mostow that scientists must try to dissuade any country from repeating that precedent (of the U.S. Government). But I would also add that we ourselves should make more effort in preserving and respecting the apolitical character of IMU Congresses. It is improper to interpret the attendance to a Congress as an act of approval—tacit—of policies of the country the Congress is held in, but it is equally improper to use a Congress for manifesting political sentiments either in the course of its preparations or during the meeting.

Let me express a hope that the ICM-86 will be less "exciting" but more successful than the ICM-82.

Czeslaw Olech
President of ICM-82

I have just returned from the International Mathematics Congress in Warsaw. The Polish Mathematicians deserve a great deal of credit for such a wonderful successful Congress in spite of the difficult conditions existing there at the present time. Poland has made a large number of contributions to mathematics (the name "Poland" even occurs in such places as "Polish notation") and has thus been worthy of being a host for an international congress.

Speaker after speaker had great praise for the Polish Mathematicians and referred to the adverse conditions under which they were forced to work. No one had any praise for the government.

Unfortunately the principle of collective guilt has become fashionable among too many people. Although every ethnic group has its good and evil elements, people often justify prejudice by identifying the whole group with its worst elements. Ironically this often leads to penalizing the victim! Thus it is too bad that more mathematicians did not participate in the Congress.

In conclusion, I feel that any application of the principle of collective guilt is unjustified whether it involves penalizing the Polish mathematical community because of the military government in Warsaw, or the mathematics department of Virginia Polytechnic Institute and State University in Blacksburg, Virginia, because of the outcome of a vote by senators in Richmond, etc.

Harry Gonshor
Rutgers University,
New Brunswick

The following text, in hundreds of duplicated copies, was distributed to participants at the International Congress of Mathematicians in Warsaw on 22 August 1983.

Chandler Davis
University of Toronto

Fellow Mathematicians:

You have come to a country which is fighting for its fundamental human rights, which were erased from Polish public life with the announcement of martial law. In the following period in the fight for the reinstatement of these rights tens of lives have been claimed on the streets, thousands of people have been imprisoned or interned, many scientific cultural and trade organizations outlawed, including the largest authentic representative of the Polish people, "Solidarność". That name, a symbol of the last three years, has not disappeared from the lips of the world. Above all "Solidarity" still lives in Poland. The street manifestations of May 1—the day of solidarity—working people from all kinds of professions took part, demonstrating in all the main Polish cities. These demonstrations were brutally broken up and suppressed by the police, a fact without precedent in the countries of the so-called socialist camp. The recent visit of Pope John Paul II was further evidence that "Solidarity" has not ceased to exist and was a time when the powerful will of millions of Poles was demonstrated. He was ceaselessly surrounded by enormous crowds where "Solidarity" banners were continually visible as well as raised hands with the "V" for victory sign.

In the powerful current of upheaval, which embraced Poland in the memorable August of 1980, Polish mathematicians were also at the fore. They likewise have been victimized by the dictatorial authorities. Fifty-one mathematicians (excluding those held for 48 hours) were arrested or interned. Four mathematicians are still wanted by the police and remain in hiding. Just before the Congress all the imprisoned mathematicians were released. But on Thursday, August 11, 1983, Grzegorz Cieciura was arrested, a mathematician from the University of Warsaw. There are mathematicians who have been thrown out of their jobs, others are unable to travel abroad. These acts of repression are only part of the revenge which afflicted the months following August 1980. Amongst those still in jail are physicist Dr. Z. Romaszewski, and historian Dr. K. Modzelewski. However, it must be pointed out that the main blow of Jaruzelski's junta has been directed against the workers from big industrial centers.
They constitute the main part of people arrested during the Jaruzelski’s war. They were also imprisoned in hardest conditions. Moreover, the majority of those murdered or beaten up were workers.

The present situation in Poland has caused many representatives of mathematics circles from all over the world to consider their attendance at the Congress unfitting. We understand and respect their decision.

Formal suppression of martial law was only a propaganda trick. New legislation established in July is in many cases even tougher than before.

The régime will present the Congress as a proof of so-called “normalization” in Poland. Tell the people in your countries that “Solidarity” is still fighting.

We are aware of the fact that not only in Poland are working people persecuted, that in many other countries human and civil rights are not respected, that social degradation exists on a world scale.

We salute all these people fighting for free and dignified work!

The following statement has been signed by 34 mathematicians participating in the International Congress of Mathematicians, Warsaw, August 1983.

Chandler Davis
University of Toronto

Minister of Higher Education
Warsaw

Honorable Mr. Minister:

Polish mathematics has for decades had an important place in world mathematics, so we mathematicians in other countries have great concern, both personal and scientific, for the fate of our Polish colleagues. We are glad to see that dozens of them who were interned (and some convicted) for political activity have been released. At the same time, the present situation gives us serious concern.

The University of Warsaw has enjoyed a degree of autonomy which universities in most other countries may justly envy. However, the newly announced regulations give the government authority to overrule the University Senate in the admission of students and professors, to expel students and professors without Senate approval, and even to dissolve the Senate. Here are some indications that these changes may be used to the detriment of the scholarly integrity of the institution.

(1) Director Andrzej Zor has announced that citizenship criteria are henceforth to be applied in hiring. (What citizenship criteria? We know from experience in our own countries how such formulas can be used to violate normal academic criteria.)

(2) The mathematician Henryk Wozniakowski, dean of the Faculty of Mathematics, Computer Science, and Mechanics, was threatened with dismissal for not stopping a meeting of students of the Faculty at which a professor wore a Solidarność button and discussed politics. But to us it seems that it was not the dean’s business to tell the professor what to wear or what to discuss; and that such surveillance must tend to make the university community passive, relinquishing the independence of decision which is needed for self-government.

(3) Some deans received an official letter dated 18 July 1983, listing names of students not to be considered for admission to the University. Reasons for their inadmissibility were given; in most cases, either conduct unbecoming a student (czyn niegodny studenta) or failing to return on time from a visit abroad; in a few cases, offenses against the provisions of martial law, which have supposedly been rescinded.

We urge that these threats of political policing not be carried out, but that Polish universities be given the conditions of freedom which they, like any universities, need.

Education in the Mathematical Sciences

As a mathematics teacher in a public high school, it is gratifying to see the growing concern in the mathematical community for the problems that exist in precollege mathematics education. The “Nation at Risk” report is, however, a poor catalogue of the problems that we face; its premise is unscientific, its findings are misleading, and some of its recommendations, if implemented, would only compound the difficulties that already exist.

As evidence of the risk that faces us, the commission cites a variety of curious data. For example, “Over half the population of gifted students do not match their tested ability with comparable achievement in school”. Can we really know when a person has certain capabilities without observing that person apply those capabilities? In spite of the commission’s disclaimer of elitist intentions, this innatist theme runs throughout the report (we are asked to assist students to work to the “limits of their capabilities”), and the reader is given the impression that the nature-nurture controversy has somehow been settled. Another example: As further evidence of the problems facing our schools, we are reminded of the decline in S.A.T. scores. There is, of course, a considerable controversy surrounding the S.A.T., and it is not at all clear that a positive correlation exists between high S.A.T. scores and anything of interest to educators. In light of this controversy, a decline in S.A.T. scores can hardly be viewed as indicative of a decline in the quality of education.

Although I have only anecdotal evidence (built up over the last fifteen years) to support my claim,
I believe that the commission is wrong when it finds that both our students and our current curriculum offerings are weaker now than in the mid-sixties. I graduated from a small suburban high school in 1965, and I was considered to be the most mathematically advanced student in my class. I know many high school students today who are much more advanced than I was at their age, both in their technical expertise and in their facility with abstraction. In 1965, virtually no one in the school where I now teach was studying calculus. Today, close to thirty students are taking calculus, about sixty students are studying linear algebra, and the combined enrollment in computer programming and pre-calculus is over four hundred (about one quarter of the school population). While enrollment in our school is going down, enrollment in mathematics courses is going up. Furthermore, most of the surrounding school systems have course offerings at least as sophisticated as ours.

These successes in mathematics education are offset by some real difficulties. Many of our classes are overcrowded, many of our teachers have weak mathematical backgrounds, and some of the topics we teach are hopelessly obsolete. However, most of the remedies that the commission sets forth do not even address these problems. We are told that we should adopt more stringent standards (and we should find "measurable" ways to tell when these standards have been met). Now, one of the best (or worst, depending on your point of view) characteristics of public education is its almost infinite malleability. If forced to, public schools can require that every student take, say, three years of mathematics; teachers can even coach students to do well on just about any standardized test. All of this can be done without significantly increasing the mathematical literacy of our students, and, if the real problems that exist in our schools are not honestly addressed, this is exactly what will happen.

We do not need a longer year or a longer day. We need more teachers. Smaller classes can make a huge difference in the number of students who really understand the course content.

There are several ways that university mathematics departments can have an impact on pre-college mathematics. I'll mention two:

(1) Offer in-service courses and summer institutes for all teachers. When NSF offered its summer institutes, thousands of secondary school teachers were exposed to top level mathematics (and to active research mathematicians). NSF is currently sponsoring a very different kind of program ("Honors Workshops for Pre-College Teachers"), and this new program has all the appeal of a beauty pageant. To obtain support, the program must identify superior teachers and assure their "recognition and prestige with certificates of honor and appropriate publicity" (elitism again). Even without NSF, however, university departments can offer their own programs for mathematics teachers. For example, a series of expository colloquium-type lectures would certainly be popular with many high school teachers.

(2) Suggest ways to revise the current secondary mathematics syllabus. There is an almost universally accepted mathematics syllabus in this country, but unlike the situation in other countries, this curriculum was not devised by mathematicians and teachers; rather it is dictated by the Educational Testing Service and a small group of book publishers. If universities want secondary schools to include more discrete mathematics, more number theory, more linear algebra, and more logic, then something must get pushed off the bottom of the stack. Perhaps university mathematicians can convince the educational establishment (ETS et al.) that some changes are in order. This is exactly what happened twenty-five years ago with SMSG.

Mathematics education will improve when mathematicians get involved with our secondary schools. We do not need more tests, more requirements, or more time in school; one of the things we do need is a partnership between the people who discover new mathematics and the people who report these discoveries to young adults.

Albert A. Cuoco
Woburn Senior High School

Bulletin Research-Expository Articles

I am writing about the issue of research-expository papers in the Bulletin, an issue which was dealt with by Ivar Ekeland in a recent letter to the Editor (Notices, August 1983, page 492). I am concerned that members of the AMS who favor the current format may not realize the seriousness of the threat to the status quo, since Ekeland was rather vague on this issue.

In 1982, the Executive Committee of the Council reviewed the publication program of the Society as one segment of its mandated continuing review of Society activities. Their report on the issue of the Bulletin read as follows:

"4. The Executive Committee reviewed complaints about the Bulletin. The Committee tried to discern reasons for the proposal that it be deleted as a privilege of membership. Some individuals offer the stated reason (possibly not valid) that it would result in a decrease in dues but the underlying question is why these individuals think that the journal is not worth its price. The Committee concluded, among other reasons, that the research-expository articles, their high quality notwithstanding, are not of a kind and level to be readily accessible to a large number of readers. The Committee
instructed the Secretary to convey this conclusion to the members of the Nominating Committee for them to keep in mind in the selection of a new member of the Committee."

(The Committee referred to, in the last word of this item, is presumably the Bulletin Editorial Committee.)

It seems to me that a small number of members who are not committed to the fundamental purpose of the Society (the fostering of mathematical research in the United States) are having undue influence. This is presumably because those members, like myself, who are basically pleased with the format of the research-expository articles have not bothered to formally comment, since we approve of the status quo.

I am writing this letter to urge all members who have opinions, either pro or con about the research-expository articles, to make their views known by letter. Since I would hope that there were too many responses to be accommodated in the Notices, I would urge concerned individuals to write to the Secretary of the Society, Professor Everett Pitcher, P.O. Box 2767, Lehigh Valley, PA 18001. The writer should include a request that his/her opinion be forwarded to the Executive Committee and the Nominating Committee.

Barry Simon
California Institute of Technology

A couple of years back, I wrote to annoy Professor Browder about the acceptance of my "research-expository" article for the Bulletin. I said, "I am not generally so impatient... but... despite much lip service honouring such, there is no market for expository work." I went on to say, "will be glad to regale you with all my half-baked theories of exposition and explain why the research-expository section of the Bulletin is destined to publish mainly condensed surveys written by top specialists for lower specialists and necessarily contentless transcriptions of one-hour addresses. I can explain why this is a problem, why this is an American problem, and why the editors of the Notices will again get letters suggesting that dues could be lowered by dropping subscribing to the Bulletin as a duty of membership (unless, of course, the reviews are more popular than I imagine)." Professor Halmos' letter in the October issue of the Notices, pages 600-601, even though his judgment covered my own paper (which, I admit, had serious shortcomings), warms the cockles of my heart. I must say that I agree with almost all he says. (For example, I still like my paper—as well as a few others.)

He says, "The main question is whether the mathematical community can produce articles such as were hoped for in sufficient numbers to achieve the desired effect. I wonder. I am inclined to be pessimistic." This question has two answers:

The mathematical community certainly can; the American mathematical community cannot and does not want to.

In view of the lip-service paid these days to exposition, the latter half of my last remark is heretical. It is, nonetheless, true:

Item. A few years ago, when I asked my formal advisor to write a letter of recommendation for me, he agreed to but he also warned me that his advisor had said something to the effect that I wrote well and was therefore incapable of doing research, whence I was unqualified for any of the jobs I had applied for.

Item. A member of a large midwestern mathematics department confided in me that he waited until he received tenure before submitting a paper to the American Mathematical Monthly because a friend of his had not been kept on for having written a (very good) book (on algebraic number theory for Springer's Universitext series).

Item. The Journal of Symbolic Logic occasionally publishes pleas for expository papers. When I sent in one commemorating the Golden Anniversary of Gödel's Theorem, a paper I wanted published (for obvious reasons) in 1981, it was several months before I first got a card announcing the paper had been sent to a referee. (I withdrew the paper and it appeared—on time—elsewhere.)

I could offer other instances of the lack of respect given by Americans to exposition, but I think these are sufficient to make my point.

And what is my point? It is not a complaint about lack of respect—I grew up in America universally despised because my voice was high (it still is), and in Western Europe I am despised for being an American. I am, in truth, more comfortable with hostility than with friendliness and merely consider the source when a colleague asks about my "suppository" writing. The point is that Americans detest exposition and are, for the most part, incapable of it. They will quote Godfrey Hardy's remark on second-rate minds in total ignorance of the number of expository books he published. American mathematicians are not scholars: they know all the latest results in their areas but publish rediscovered older results out of (I hope) ignorance; they consider a list of credits to be history; they work on problems that have names attached to them in ignorance of the origins of these problems—they are, in brief, uncivilised in Professor Shisha's sense (Letters to the Editor, October Notices, page 603) and they are distrustful of anyone who is civilised. (In brief (again), American mathematics is a microcosm of American society.)

Before I surpass Morris Kline in condemnation, let me note that what I have said is not true in other cultures. The Bulletin of the London Mathematical Society, not being as ambitious as its American counterpart, only occasionally publishes
expository items. I only occasionally look at their surveys, but I consider them well-written. In the Séminaire Bourbaki, mathematicians actively exposit the work of others. And, in Germany, where there has traditionally been a shortage of academic positions and many work at Gymnasia isolated from active research, the amount of solid mathematical exposition is out of all proportion to the size of the mathematical population.

In brief (yet again): Good mathematical "research-exposition" is possible; it just won't be found very often in the Bulletin of the AMS.

Craig Smoryński
San Jose State University

Axiom of Choice

F. G. Asenjo's letter on the question of the priority of discovery of the Axiom of choice (Notices, October 1983, pages 602-603) reminded me of a conversation which I had with an Italian colleague several years ago when I was visiting Milan. During the course of our discussion on the correctness of Peano's Axiom of Succession, my host suggested that Russell was universally given credit for a discovery which he had borrowed from Peano. My host went further, and expounded the theory of anti-Semitism as the (hidden) motive for assigning priority to Russell of discoveries which were in fact due to Peano.

It is well known and generally acknowledged that the notation of Russell's Principia is essentially that of Peano. Russell himself acknowledged this (pages vii, viii of the Preface of Principia). On the first page of the Preface, Russell wrote that "symbolic logic [which] after a necessary period of growth, has now, thanks to Peano and his followers, acquired the technical adaptability and logical comprehensiveness that are essential to a mathematical instrument...." This statement does absolutely nothing to identify the contributions of Peano and his school or to elucidate Russell's indebtedness to Peano. It seems indeed to have the opposite effect. In the general consensus view of history of logic, it is held that Peano presented an axiomatization of set theory and of arithmetic in the same way that Euclid axiomatized geometry, but that Peano failed to provide his system with the inference rules required to make it a formal deductive system. Russell himself (page viii of the Principia Preface) provided the historical foundation for the view that the Fregean Rule of Detachment provided the necessary logical tool for creating a formal deductive system out of Peano's axiom system, and that it was Russell's Principia that effected this contribution. Alessandro Atti of Rivista Internazionale di Logica points out that Peano's Axiom 9 of the Principles of Arithmetic (usually referred to as Axiom 5 in the short list) can be thought of as a weak version of Dedekind's formulation of Mathematical Induction, as it usually is, or as a rule of logical inference. If the latter is true, as Atti suggests, then we owe to Peano rather than to Russell the first formal deductive system of set theory.

With reference to Asenjo's discussion of Moore's judgment on Beppo Levi's priority in discovery of the Axiom of Choice, I must mention that Moore does, in a footnote on page 80, refer to the assertion of Hubert Kennedy, as well as those of Beth and van Heijenoort mentioned by Asenjo, that priority belongs to Levi. The question which Asenjo's questioning of Moore's ascription to Zermelo rather than Levi of priority raises then becomes: Is Levi's Partition Principle equivalent to the Axiom of Choice? Moore admits that it is. And so he assigns priority to Zermelo rather than Levi on the basis of Levi's negative attitude towards its use. I hope that our colleagues (whether in Italy or elsewhere) will not find in this priority controversy another example of racial bias, similar to that found in denigration of the contributions of Peano as over and against the (alleged) contributions of Russell.

Irving H. Anellis
University of Iowa

Registration at Meetings

After 23 years of membership in the AMS, I decided not to pay my 1983 dues until late in the year. That was one way to avoid receiving the Bulletin! The fact that I do not wish to receive the Bulletin does not mean that I do not wish to have an opportunity to read the Bulletin. I don't want to receive Mathematical Reviews either; they cost a lot of money too, and I don't have room for them in my office either. However, I do use Mathematical Reviews and I wish to support Mathematical Reviews. I also wish to support AMS. On the other hand, I strongly object to hiring guards to keep people from looking at mathematics books unless they are willing to pay $49 to register for a meeting (e.g. Denver, January 1983)! Before leaving for California to visit my daughter, I went to Denver to look at the new mathematics books because our library only buys a few books. I chose not to pay and look at the books. I also chose not to pay my AMS dues. You spend $12 to send me books that I don't want, you hire guards so I can't look at mathematics books and you expect me to pay for such services. Having tilted my windmill, I enclose my dues payment.

Richard B. Darst
Colorado State University

EDITOR'S NOTE: The table below extends that published in the February 1981 issue of the Notices (page 196); it shows how much money the Society loses on its national meetings. The fact that the size of the usual deficits is so high provides the real answer to Professor Darst's complaint. The mathematical organizations have not previously been making a very serious effort to see that these meetings are put on a sound financial basis. The Report on Registration Fees cited in the February 1981 Notices lists examples
which indicate that the fees charged by AMS and MAA in 1981 were extremely low in comparison with those of other groups. The fact of the matter is that the Mathematics Meetings continue to get more elaborate, the programs have been enriched significantly, and more and more peripheral activities are scheduled. All of these trends make the meetings more expensive. Since costs would have risen even without any enhancements or expansion because of the inflation we have had for the past several years, the registration fees would have to grow much faster than inflation in order to keep things in balance. The Society’s Trustees entertain (almost periodically) proposals to cancel the Summer Meetings since they tend to put severe financial drains on the Society’s resources. It is possible that they have become just too expensive to be supported by the members who attend them. The Society does not hire guards to stand outside the rooms where talks are given in order to see to it that everyone who enters is wearing a badge, as most other organizations do. But it is necessary to hire a guard to sit all night to protect the books and other material exhibited or required by the meeting staff. It follows that looking at books is not something that is free at all. It costs money and it gets more expensive every year. A few years ago spot checks revealed that, on the average, ten percent of those whose names appeared on the program failed to register for the meeting.

Silviu Teleman

I am writing on behalf of my brother, mathematician Silviu Teleman, member of this Society, and his family living in Romania.

Silviu Teleman has made significant contributions in the theory of harmonic algebras, their spectral theory and their sheaf representation, algebraic reduction theory of von Neumann algebras; he is co-author of the Springer Lecture Notes in Mathematics volume 248. For some of his work, see Mathematical Reviews 50 #13165, 46 #7920, 49 #1143, 54 #950; see also: 45 #9153, #8677, 52 #15034.

In November 1981, Silviu Teleman, his wife and their two sons applied for exit visas from Romania. Since then three times their exit visas were denied. Silviu, a person of high moral integrity, asks that the elementary right of any individual to emigrate be recognized by him and his family. With the time passing, their situation becomes precarious in many respects.

I am appealing to the mathematical community to show support and help my brother Silviu's family in their request for exit visas from Romania.

Please write letters of support for my brother to the Romanian Embassy in Washington, D.C. 20520, and please express your concern to: Senator Daniel P. Moynihan, 733 Third Avenue, 22nd Floor, New York, New York 10017; Senator Alfonse M. D’Amato, Suite 1635, One Pennsylvania Plaza, New York, New York 10001.

N. Teleman
SUNY, Stony Brook

Addendum to the List of Refuseniks

I am a mathematician interested in the inverse problems of mathematical physics (potentials, coefficients identification, spectral problems). My wife is also a mathematician. Our family was first refused to emigrate from the U.S.S.R. in July 1982, without legitimate grounds like knowledge of state secrets or others approved in the International Covenant on Civil and Political Rights.

As a consequence I have lost my position of researcher at the Institute of Mathematics and of associate professor at the University. In the exchange I was offered only a technical job that does not fit my qualifications and at 40% of the previous salary.

I ask my colleagues to write to me and send me preprints of their works, abstracts of papers presented at conferences, etc. to allow me to continue my research and not be cut off from mathematical life.

Victor Isakov
Ilijicha, 13, Apt. 37
Novosibirsk, 630090, U.S.S.R.

Policy on Letters to the Editor

Letters submitted for publication in the Notices are reviewed by the Editorial Committee, whose task is to determine which ones are suitable for publication. The publication schedule requires from two to four months between receipt of the letter in Providence and publication of the earliest issue of the Notices in which it could appear.

Publication decisions are ultimately made by majority vote of the Editorial Committee, with ample provision for prior discussion by committee members, by mail or at meetings. Because of this discussion period, some letters may require as much as seven months before a final decision is made.

The committee reserves the right to edit letters.

The Notices does not ordinarily publish complaints about reviews of books or articles, although rebuttals and correspondence concerning reviews in the Bulletin of the American Mathematical Society will be considered for publication.

Letters should be mailed to the Editor of the Notices, American Mathematical Society, Post Office Box 6248, Providence, Rhode Island 02940, and will be acknowledged on receipt.
Division of Mathematical Sciences

Following tradition, we are using this mechanism to keep you informed of the activities of the National Science Foundation which are of interest to the mathematical sciences community. Also in keeping with tradition, this report is lengthy.

Reorganization. There has been some significant reorganization within the Division of Mathematical and Computer Sciences of which the Mathematical Sciences Section was a part. A split of the division into two divisions has been made: one a Division of Mathematical Sciences, the other a Division of Computer Research. In the Division of Mathematical Sciences, E. F. Infante is Division Director with Judith S. Sunley as Acting Deputy Division Director. In the Division of Computer Research, Kenneth Curtis is the official Deputy Division Director and is currently the Acting Division Director.

Personnel. As many of you know, William G. Rosen has retired from the Foundation and is currently the Deputy Director of the U.S.-Israel Binational Science Foundation. He will be in Jerusalem for three years.

There has been a good deal of turnover in our professional and secretarial staff during the past year. Listed below are the program organization for the coming year and the program officers with whom you will be dealing. We hope you will bear with us as the six incoming rotators become oriented to our procedures.

<table>
<thead>
<tr>
<th>Field</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classical Analysis</td>
<td>John V. Ryff</td>
</tr>
<tr>
<td>Topology &amp; Foundations</td>
<td>Ralph Krause</td>
</tr>
<tr>
<td>Special Projects</td>
<td>Alvin Thaler</td>
</tr>
<tr>
<td>Geometric Analysis</td>
<td>Su-Shing Chen</td>
</tr>
<tr>
<td>Applied Mathematics</td>
<td>Melvyn Ciment</td>
</tr>
<tr>
<td>Algebra &amp; Number Theory</td>
<td>John Lagnese</td>
</tr>
<tr>
<td>Modern Analysis</td>
<td>Bernard McDonald</td>
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<tr>
<td>Statistics &amp; Probability</td>
<td>Frank Gilfeather</td>
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<td></td>
<td>Jerome Sacks</td>
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</tbody>
</table>

Ryff, Krause and Thaler are regulars. Chen (University of Florida), Ciment (National Bureau of Standards), Lagnese (Georgetown University), McDonald (University of Oklahoma), Gilfeather (University of Nebraska), and Sacks (Northwestern University) are rotators on leave from their regular positions.

A special word of thanks is due our five outgoing rotators: Victor Barcilon (returning to the University of Chicago), George Cybenko (returning to Tufts), Prem Goel (moving to Ohio State University), Harvey Keynes (returning to the University of Minnesota), and Zbigniew Nitecki (returning to Tufts). Their hard work and expertise were of great value in our activities during the past year.

Research Proposals. Please note a few changes from past practice. In particular, there is no longer any deadline for the submission of standard research proposals. Your faculty should be reminded that it takes six to nine months to complete the processing of a proposal. In particular, we recommend allowing at least seven months between the time the proposal is received and the time by which a decision on the proposal is desired. Complete information on submission of research proposals will appear in the February issue of the Notices.

In a departure from tradition, we have decided to refrain from sending letters reminding holders of expiring grants that they need to resubmit a proposal. This is part of a long-term project to encourage the mathematical sciences community to take greater responsibility for the administrative details of their sponsored research projects. Your Research or Grants Office should be able to provide a list of those who should be resubmitting proposals in the coming months.

Budget. The Congress has passed and the President has signed the FY 1984 Appropriation measure for the Foundation. Thus we are entering this fiscal year with a fairly clear understanding of budget levels and priorities. The Division's budget will increase over FY 1983 by about 24%. Much of that increase is targeted toward specific items, such as enhanced support of graduate students and postdoctorals, visitor and sabbatical support, and increased support for computational mathematics.

Graduate Students. In the past, the level of support for graduate students on research grants in the mathematical sciences has been exceptionally low. The increase in funds for graduate support in FY 1984 is roughly equivalent to full-time support for 70 students. This adds to a base which is roughly equivalent to full-time support for 180 students. In distributing the increased funds, the peer reviewers and program directors need to evaluate not only the impact of graduate student support on a given research program, but also the impact of such support on the university's graduate program and the appropriateness of such support in the broader context of the Division's responsibility for graduate training. In order that allocations be made on a consistent body of information, we are encouraging department chairs (where appropriate) to provide us with information on their graduate programs and on how they have used NSF graduate student support in the past. We are making the request in this informal way in the hope of initiating a continuing dialogue...
with the mathematical sciences community on the subject of graduate student support.

**Advisory Panel.** The Advisory Subcommittee for the Mathematical Sciences met October 14 and 15, 1983. W. Browder of Princeton University is the chairman of this body. The committee's advice is very important to us in setting priorities and developing long-range plans for the Division. Suggestions for discussion items of concern to the community would be welcome for future meetings.

**Exciting Mathematical Interest.** Researchers in the mathematical sciences have no difficulty in becoming excited about new results in the field. Those of us at NSF must not only learn of the exciting results in the field, but convey in a meaningful way the excitement of our community to those whose primary interest is in other fields. Your help in this task is essential and can be provided by keeping us informed about important research results and giving us your ideas on presenting those results to others. This is a crucial part of our role in keeping the mathematical sciences in public view.

**Science and Engineering Education**

A Directorate for Science and Engineering Education has been established effective October 1, 1983. An internal organizational structure for this new directorate is now being developed.

The FY 1983 Appropriation for Science and Engineering Education was $30 million; $15 million to continue the Graduate Research Fellowship program; and $15 million to establish new programs at the precollege level. The precollege plan for the use of these funds consists of three activities:

- **Presidential Awards** for Teaching Excellence in Science and Mathematics—to provide national recognition to outstanding science and mathematics teachers and help improve image and status of teachers—$1 million.

- **Honors Workshops** for Science and Mathematics Teachers to recognize and honor excellent teachers, provide renewal and updating for top quality teachers and utilize the perspective of these teachers as planning aids to improve teaching situations—$2 million.

- **Materials Development** for Precollege Science and Mathematics—to develop teacher capabilities in critical areas of science and mathematics and improve their instruction of students—$12 million.

The Materials Development activity will support projects in five areas:
- Models and demonstrations of programs for continuing education of teachers.
- Development of materials, teaching aids, computer programs, software and systems and television-based materials, etc. to improve science and mathematics teaching.
- Analysis of precollege science and mathematics education systems.

- Dissemination of ideas and materials for sustaining high quality precollege science and mathematics teaching.
- Applied research aimed at understanding how the processes of teaching and learning of science and mathematics can be more effective.

For FY 1984, the Science and Engineering Education Appropriation totals $75 million. Of this total $20 million is for Graduate Research Fellowships. Within this amount the number of new offers of awards will be increased from 500 to 600. Also, the stipend and cost-of-education allowance for each fellow is increased, respectively, from $6,900 to $8,100 and $4,000 to $4,900. The amount of $55 million is for precollege activities. That will follow on and extend the FY 1983 plan. Additional program announcements can be expected, but these will not be published for several months.

With substantially increased responsibilities, it is likely that there will be a significant reorganization of the Office of Scientific and Engineering Personnel and Education, including an increase in staff. We will endeavor to keep you informed of developments. The Foundation strongly encourages the research community to participate actively in its science and engineering education programs at all levels. Also, the Office is seeking qualified applicants for positions which become available in the physical, mathematical and computer sciences. The positions will be filled on a one- or two-year basis under the provisions of NSF's rotator program and are excepted from the competitive civil service. The salaries range from $34,930 to $53,661 per annum. Applicants should have a Ph.D. or equivalent experience and training in an appropriate field. Preference will be given to those who have six years of teaching and research experience at the college or university level beyond the Ph.D. Experience and familiarity with mathematics and education at the secondary school level are essential. Incumbents will also contribute to the range of staff expertise available to advise on other activities of the Office.

It is important to note that the $75 million is part of the standard NSF appropriation for FY 1984 which already has been enacted into law. In addition, separate legislation is pending that would authorize additional programs in science and mathematics education both for NSF and the Department of Education.

However, the outlook for this legislation is quite uncertain. The House passed H. R. 1310 last March, but the Senate has not yet acted upon the analogous S. 1285. Even with Senate action on S. 1285, it is sufficiently different from H. R. 1310 to make the outcome of a House-Senate Conference unpredictable. Even given passage of some compromise legislation, separate action would still be necessary for appropriations for the authorized programs. In a tight budget year, it is unclear what the result might be.
Final Words

The coming year will provide all of us with many challenges. Making individual decisions on a large number of proposals within the total budget framework is becoming increasingly intricate. We know we will have the cooperation of the entire mathematical sciences community in carrying out this task. If you have any questions or are interested in following up any of the items mentioned above, please feel free to contact any of us or the appropriate program officer.

Judith S. Sunley and E. F. Infante
Mathematical Sciences
Alphonse Buccino
Science and Engineering Education

CONTEMPORARY MATHEMATICS, VOLUME 22

Factorizations of $b^n \pm 1$, $b = 2, 3, 5, 6, 7, 10, 11, 12$
up to High Powers
John Brillhart, D. H. Lehmer, J. L. Selfridge,
Bryant Tuckerman, and S. S. Wagstaff, Jr.

This book is the collection of hundreds of results of workers dating from the seventeenth century. It is an extension of a rare work by Cunningham (1925) with the same title. It gives an historical account of the various methods and machines that have been used to factor, and prove prime, the numbers $b^n \pm 1$. It is intended that the empty spaces in the tables be filled in by future workers. The back of the book contains an envelope for holding up-dating material.

The factorizations and the very large primes are of use in applications to Group Theory, Number Theory, Random Number Generators and Cryptography.

The title suggests, the book contains tables of factorizations of $b^n - 1$ and $b^n + 1$ for $b = 2, 3, 5, 6, 7, 10, 11, 12$ for $n$ up to some large limit. This limit is 1200 for $b = 2$. For other $b$ the limit is chosen so that $b$ goes up to about $10^{150}$. Certain polynomial identities permit larger $n$ in some cases.

Primes and probable primes larger than $10^{25}$ are collected in an appendix to avoid cluttering the main tables. Another appendix lists summaries of primality proofs for the large primes. A third appendix gives composite cofactors up to $10^{64}$.

The factorizations are presented in condensed form in the main tables. For the benefit of amateur mathematicians (and professional mathematicians in a hurry) the complete factorizations of $2^n - 1$, $2^n + 1$, $10^n - 1$, and $10^n + 1$ are collected in four tables. The limits on $n$ in these tables are smaller than those in the main tables.

The book has an extensive and valuable introduction to the tables. It describes the developments in computing technology and in methods of factoring and primality testing which have occurred since 1925. It discusses the multiplicative structure of $b^n \pm 1$ and explains the relation between the two kinds of algebraic factorizations of these numbers.

Libraries will need a reference copy. Many professional and amateur mathematicians, especially in number theory and algebra, will want a copy. Some computer scientists and cryptographers will also want a copy because the book has some connection to cryptography and data security.

1980 Mathematics Subject Classifications: 10A25; 10-04

AMS TRANSLATIONS, SERIES 2

The Kourovka Notebook:
Unsolved Problems in Group Theory
translated by D. L. Johnson and others
Lev J. Leifman and D. L. Johnson, Editors

From the Preface:
To form an up-to-date picture of what is going on in a given area of mathematics, we usually consult a shelf of current periodicals or, to save time, the appropriate section of a reviewing journal. Thus we learn of new advances in the area, which problems have been solved, what progress has been made with others, while rarely, and then only in the context of the author's own results, we learn which problems the author failed to solve but considers interesting. In all this, a summary of current problems has no less a place in the development of a subject than a list of achievements, though the apparent connection between the two is often deceptive. Thus, it is desirable to publish from time to time a summary of important problems with the participation of a large circle of authors. The Kourovka notebook is such a collection of unsolved problems in group theory.

The current edition is the seventh, the first having appeared in 1965. Experience has shown that the idea of collecting problems of interest in a given area at a given time is fully justified. Of the 422 problems in the sixth edition, 151 have now been solved.

This edition is augmented by Chapter 7. The first six chapters have been reproduced from the sixth edition with slight editorial changes. The comments on the problems have been reviewed and augmented.

1980 Mathematics Subject Classification: 20-06

Prepayment is required for all AMS publications. Order from AMS, P.O. Box 1571, Annex Station, Providence, RI 02901, or call toll free 800-556-7774 to charge with Visa or MasterCard.
The Mathematical Heritage of Henri Poincaré
Felix E. Browder, Editor

On April 7-10, 1980, the American Mathematical Society sponsored a Symposium on the Mathematical Heritage of Henri Poincaré, held at Indiana University, Bloomington, Indiana. This volume presents the written versions of all but three of the invited talks presented at this Symposium (those by W. Browder, A. Jaffe, and J. Mather were not written up for publication). In addition, it contains two papers by invited speakers who were not able to attend, S. S. Chern and L. Nirenberg.

If one traces the influence of Poincaré through the major mathematical figures of the early and mid-twentieth century, it is through American mathematicians as well as French that this influence flows, through G. D. Birkhoff, Solomon Lefschetz, and Marston Morse. This continuing tradition represents one of the major strands of American as well as world mathematics, and it is as a testimony to this tradition as an opening to the future creativity of mathematics that this volume is dedicated.

Contents: PART 1

Section 1. Geometry
Shing-Shen Chern, Web geometry
Jun-Ichi Igusa, Problems on abelian functions at the time of Poincaré and some at present
John Milnor, Hyperbolic geometry: the first 150 years
Ngaiming Mok and Shing-Tung Yau, Completeness of the Kähler-Einstein metric on bounded domains and the characterization of domains of holomorphy by curvature conditions
Alan Weinstein, Symplectic geometry

Section 2. Topology
J. Frank Adams, Graeme Segal’s Burnside ring conjecture
William P. Thurston, Three dimensional manifolds, Kleinian groups and hyperbolic geometry

Section 3. Riemann surfaces, discontinuous groups and Lie groups
Lipman Bers, Finite dimensional Teichmüller spaces and generalizations
Wilfried Schmid, Poincaré and Lie groups
Dennis Sullivan, Discrete conformal groups and measurable dynamics

Section 4. Several complex variables
Michael Beals, Charles Fefferman and Robert Grossman, Strictly pseudoconvex domains in $\mathbb{C}^n$
Phillip A. Griffiths, Poincaré and algebraic geometry
Roger Penrose, Physical space-time and nonrealizable CR-structures
R. O. Wells, Jr., The Cauchy-Riemann equations and differential geometry

PART 2

Section 5. Topological methods in nonlinear problems
Raoul Bott, Lectures on Morse theory, old and new
Haim Brezis, Periodic solutions of nonlinear vibrating strings and duality principles
Felix E. Browder, Fixed point theory and nonlinear problems
L. Nirenberg, Variational and topological methods in nonlinear problems

Section 6. Mechanics and dynamical systems
Jean Leray, The meaning of Maslov’s asymptotic method: the need of Planck’s constant in mathematics
David Ruelle, Differentiable dynamical systems and the problem of turbulence
Steve Smale, The fundamental theorem of algebra and complexity theory

Section 7. Ergodic theory and recurrence
Harry Furstenberg, Poincaré recurrence and number theory
H. Furstenberg, Y. Katznelson and D. Ornstein, The ergodic theoretical proof of Szemerédi’s theorem

Section 8. Historical material
P. S. Aleksandrov, Poincaré and topology
Henri Poincaré, Résumé analytique
Jacques Hadamard, L’oeuvre mathématique de Poincaré

1980 Mathematics Subject Classifications: 01, 14, 22, 30, 32 & others

Prepayment is required or charge with Visa or MasterCard.
The January 1984 Joint Mathematics Meetings, including the 90th Annual Meeting of the AMS and the 67th Annual Meeting of the Mathematical Association of America will be held January 25–28 (Wednesday–Saturday), 1984, in Louisville, Kentucky. The meetings will be preceded by the AMS Short Course on January 23–24 (Monday–Tuesday), 1984. Sessions will take place in the Commonwealth Convention Center and the Hyatt Regency Louisville.

The members of the Local Arrangements Committee are W. Wistar Comfort (ex-officio), Roger H. Geeslin (publicity director), Thomas L. Holloman, William J. LeVeque (ex-officio), David P. O’Toole, David P. Roselle (ex-officio), Richard Werle, and W. Wiley Williams (chairman).

WHERE TO FIND IT

ANNUAL MEETING OF THE AMS 23
Gibbs Lecture, Colloquium Lectures, Prizes, Invited Addresses, Special Sessions, Contributed Papers, Other AMS Sessions, Council and Business Meetings

AMS SHORT COURSE 25
EMPLOYMENT REGISTER 43
ANNUAL MEETING OF THE MAA 28
Retiring Presidential Address, Invited Addresses, Minicourses, Other MAA Sessions, Business Meeting, Board of Governors

OTHER ORGANIZATIONS 30
AWM, NAM, NSF, RMHC

TIMETABLE 27

OTHER EVENTS OF INTEREST 30
Book Sales, Exhibits, MATHFILE, Meeting of Department Chairmen, Petition Table

ACCOMMODATIONS 32
Hotels

REGISTRATION AT THE MEETINGS 38
Fees, Dates and Times, Services

MISCELLANEOUS INFORMATION 42
Child Care, Local Information, Parking, Social Event, Travel, Weather

MAP 34

PRESENTERS OF PAPERS 45
PROGRAM OF THE SESSIONS 47

IMPORTANT DEADLINES

AMS Abstracts,
For consideration for special sessions  Expired
Of contributed papers  Expired
Employment Register
(Applicants & Employers)  Expired
Preregistration and Housing  Expired
Motions for AMS Business Meeting  Expired
Preregistration cancellations (50% refund)  January 22
Dues credit for nonmembers/students  February 29

90th Annual Meeting of the AMS
January 25–28, 1984

Fifty-seventh Josiah Willard Gibbs Lecture
The 1984 Gibbs lecture will be presented at 8:30 p.m. on Wednesday, January 25, by HERBERT A. SIMON of Carnegie-Mellon University. Professor Simon will speak on Computer programs that model the process of scientific and mathematical discovery.

Colloquium Lectures
There will be a series of four Colloquium Lectures presented by BARRY MAZUR of Harvard University. The title of this lecture series is On the arithmetic of curves. The lectures will be given at 1:00 p.m. daily, Wednesday through Saturday, January 25–28.

Bocher Prizes
The 1984 Bocher Memorial Prizes will be awarded at 4:00 p.m. on Thursday, January 26.

Invited Addresses
By invitation of the Program Committee, there will be eight invited one-hour addresses. The names of the speakers, their affiliations, and the dates, times, and titles of their talks follow:

GUNNAR CARLSSON, University of California, San Diego, Segal's Burnside ring conjecture, 2:15


Ordered algebraic structures, Andrew M. W. Glass, Bowling Green State University, Thursday morning, Friday and Saturday afternoons. Richard N. Ball, Paul Conrad, Michael R. Darnel, John Dauns, Trevor Evans, Anthony W. Hager, Melvin Henriksen, Mary E. Huss, Suzanne Larson, James J. Madden, Jorge Martinez, Stephen H. McCleary, François Point, Wayne B. Powell, Akbar Rhemtulla, M. Satyanarayana, Stuart Steinberg, and Constantine Tsinakis.


Ring theory, M. Susan Montgomery, University of Southern California, and Lance Small, University of California, San Diego, Wednesday afternoon and Thursday morning. Miriam Cohen.
American Mathematical Society Short Course Series

Introductory Survey Lectures on
Mathematics of Information Processing

Louisville, Kentucky, January 23–24, 1984

The American Mathematical Society, in conjunction with its ninetieth annual meeting, will present a one and one-half day short course titled Mathematics of Information Processing on Monday afternoon and Tuesday morning and afternoon, January 23 and 24, 1984, at the Hyatt Regency Louisville. The program is under the direction of Michael Anshel of CUNY, City College, and William Gewirtz of Bell Laboratories, Holmdel.

The course will cover a number of areas in which mathematical techniques have led to a deeper understanding of Information Processing. The earliest applications of mathematics were in the design and analysis of algorithms and in the modeling of systems performance. Motivated by the challenge to use effectively the capabilities resulting from dramatically increased system capacity, multi-programming, parallel processing, and distributed computing environments, mathematics continues to play an important role in the design and analysis of computer systems.

While mathematical logic and related disciplines have traditionally been intimately related to the foundations of computing, areas of more practical application have arisen in recent years. Specifically, in the area of database systems, both database languages and database design techniques have seen important applications of mathematical logic and related subjects.

Synopses of the talks and accompanying reading lists appeared on pages 661–662 of the October 1983 Notices. The speakers and their titles are: Fan R. K. Chung (Bell Laboratories, Murray Hill), Diameters of Communication Networks; Hector Garcia-Molina (Princeton University), Transaction Management; Barry E. Jacobs (University of Maryland), Fundamental Database Issues; Victor S. Miller (IBM, Yorktown Heights), Data Compression Algorithms; Avgustin Tuzhilin (CUNY, City College at Staten Island), Application of Category Theory of Structural Sets to Modeling of Information Bases of Systems; and Moshe Y. Vardi (IBM, San Jose), The Theory of Data Dependencies—A survey. Time will be allocated for summarizing and integrating the material presented in the lectures.

The short course is open to all who wish to participate upon payment of the registration fee. There are reduced fees for students and unemployed individuals. Please refer to the section on Registration at the Meetings for details.

The short course was recommended by the Society's Committee on Employment and Educational Policy, whose members are Lida K. Barrett, Lisl Novak Gaal, Irwin Kra, Robert W. Mckelvey, Donald C. Rung (chairman), and Barnet M. Weinstock. The short course series is under the direction of the CEEP Short Course Subcommittee, whose members are Stefan A. Burr (chairman), Lisl Novak Gaal, Robert W. Mckelvey, Cathleen S. Morawetz, Barbara L. Osofsky, and Philip D. Straffin, Jr.


October 12 was the deadline for submission of abstracts for consideration for inclusion in these special sessions.

Contributed Papers

There will be sessions for contributed papers Wednesday morning and afternoon, Thursday morning, Friday afternoon, and Saturday afternoon. November 2 was the deadline for submission of abstracts for contributed papers.

Late papers will not be accepted.

Other AMS Sessions

Mathematics and Government

Edward E. David, Jr., former Science Advisor to the President of the United States, will deliver a Special Address titled Mathematics in the technical enterprise: Maximizing the impact at 4:45 p.m. on Wednesday, January 25.

A major effect on future support of mathematical research in the country is expected from the findings of the Committee on Resources from the Mathematical Sciences, which Dr. David has chaired for the past two-and-one-half-years. The Committee's report, which has just been submitted to the National Research Council, is expected to form the background for his talk. Dr. David, currently President of Exxon Research and Engineering, has a long acquaintance with applications of mathematics. A communications engineer trained at the Massachusetts Institute of Technology, he spent twenty years at Bell Telephone Laboratories, where he became Executive Director of Research before being asked to serve by the White House.

AMS Committee on Employment and Educational Policy

A Panel Discussion, moderated by Lida K. Barrett, on the supply of mathematical science researchers in the 1990s will be held from 4:45 p.m. to 6:15 p.m. on Friday, January 27. Speakers include Maureen McKeough, James D. Stasheff, Gail S. Young, and Wilson M. Zaring.

Council Meeting

The Council of the Society will meet at 2:00 p.m. on Tuesday, January 24, in the Hyatt Regency Louisville.

Business Meeting

The Business Meeting of the Society will take place immediately following the award of the Böcher Prize at 4:00 p.m. on Thursday, January 26. The secretary notes the following resolution of the Council: Each person who attends a Business Meeting of the Society shall be willing and able to identify himself as a member of the Society. In further explanation, it is noted that each person who is to vote at a meeting
The final version of the Timetable and Program, including room assignments, will be distributed at the meeting.

### AMERICAN MATHEMATICAL SOCIETY SHORT COURSE SERIES

#### MONDAY, January 23

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>11:00 a.m. - 4:00 p.m.</td>
<td>REGISTRATION (Short Course only)</td>
</tr>
<tr>
<td>2:00 p.m. - 3:00 p.m.</td>
<td>Fundamental database issues                                          Barry E. Jacobs</td>
</tr>
<tr>
<td>3:30 p.m. - 4:30 p.m.</td>
<td>The theory of data dependencies—a survey                             Moshe Y. Vardi</td>
</tr>
<tr>
<td>4:45 p.m. - 5:15 p.m.</td>
<td>General discussion</td>
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#### TUESDAY, January 24

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<tr>
<td>8:00 a.m. - 2:00 p.m.</td>
<td>REGISTRATION (Short Course only)</td>
</tr>
<tr>
<td>9:00 a.m. - 10:00 a.m.</td>
<td>Diameters of communication networks                                  Fan R. K. Chung</td>
</tr>
<tr>
<td>10:30 a.m. - 11:30 a.m.</td>
<td>Data compression algorithms                                           Victor S. Miller</td>
</tr>
<tr>
<td>1:30 p.m. - 2:30 p.m.</td>
<td>Application of category theory of structural sets to modeling of information bases of systems Avgustin Tuzhilin</td>
</tr>
<tr>
<td>3:00 p.m. - 4:00 p.m.</td>
<td>Transaction management                                               Hector Garcia-Molina</td>
</tr>
<tr>
<td>4:15 p.m. - 4:45 p.m.</td>
<td>General discussion</td>
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### JOINT MATHEMATICS MEETINGS

#### TUESDAY, January 24

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<tbody>
<tr>
<td>2:00 p.m. - 10:00 p.m.</td>
<td>COUNCIL MEETING</td>
</tr>
<tr>
<td>4:00 p.m. - 8:00 p.m.</td>
<td>REGISTRATION</td>
</tr>
<tr>
<td>4:00 p.m. - 8:00 p.m.</td>
<td>AMS BOOK SALE                                                         MAA BOOK SALE</td>
</tr>
</tbody>
</table>

#### WEDNESDAY, January 25

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>REGISTRATION</td>
</tr>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>AMS BOOK SALE                                                         MAA BOOK SALE</td>
</tr>
<tr>
<td>8:00 a.m. - 11:20 a.m.</td>
<td>SPECIAL SESSIONS</td>
</tr>
<tr>
<td>8:00 a.m. - 11:50 a.m.</td>
<td>Commutative Algebra I</td>
</tr>
<tr>
<td>8:30 a.m. - 11:55 a.m.</td>
<td>Vector Field Systems and Control I</td>
</tr>
<tr>
<td>9:00 a.m. - 10:00 a.m.</td>
<td>SESSIONS FOR CONTRIBUTED PAPERS</td>
</tr>
<tr>
<td>9:00 a.m. - 10:50 a.m.</td>
<td>Ring Theory</td>
</tr>
<tr>
<td>8:30 a.m. - 11:55 a.m.</td>
<td>Combinatorics</td>
</tr>
<tr>
<td>9:00 a.m. - 10:00 a.m.</td>
<td>INVITED ADDRESS</td>
</tr>
<tr>
<td>9:00 a.m. - 10:50 a.m.</td>
<td>Homotopy Theory I</td>
</tr>
<tr>
<td>9:00 a.m. - 10:50 a.m.</td>
<td>SPECIAL SESSIONS</td>
</tr>
</tbody>
</table>

27
is thereby identifying himself as and claiming to be a member of the American Mathematical Society. For additional information on the Business Meeting, please refer to the box titled Committee on the Agenda for Business Meetings.

67th Annual Meeting of the MAA
January 26–28, 1984

MAA Sessions will take place in the Commonwealth Convention Center and the Hyatt Regency Louisville.

Retiring Presidential Address
Richard D. Anderson, Louisiana State University, Baton Rouge, will deliver his Retiring Presidential Address on Reflections on the mystique of R. L. Moore at 9:00 a.m. on Saturday, January 28. This talk will be preceded at 8:00 a.m. by a film about the late R. L. Moore titled Challenge in the classroom.

Invited Addresses
There will be seven invited fifty-minute addresses. The list of speakers, their affiliations, the dates and times of their talks, and their titles follow:

<table>
<thead>
<tr>
<th>Minicourses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minicourse #1: <strong>Linear programming</strong>, Charles E. Haff, University of Waterloo.</td>
</tr>
<tr>
<td>Minicourse #2: <strong>Discrete algorithmic mathematics</strong>, Stephen B. Maurer, Swarthmore College.</td>
</tr>
<tr>
<td>Minicourse #3: <strong>Teaching problem solving</strong>, Alan H. Schoenfeld, University of Rochester.</td>
</tr>
<tr>
<td>Minicourse #4: <strong>Applications of discrete mathematics</strong>, Fred S. Roberts, Rutgers University.</td>
</tr>
<tr>
<td>Minicourse #5: <strong>Problems from industry</strong>, Jeanne L. Agnew and Marvin S. Keener, both of Oklahoma State University.</td>
</tr>
<tr>
<td>Minicourse #6: <strong>Applications of computer graphics</strong>, Joan Wyzkoski, Bradley University.</td>
</tr>
<tr>
<td>Minicourse #7: <strong>CONDUIT microcomputer software</strong>, David A. Smith, Duke University.</td>
</tr>
<tr>
<td>Minicourse #8: <strong>NonCONDUIT microcomputer software</strong>, David A. Smith, Duke University.</td>
</tr>
</tbody>
</table>

The MAA Sessions will take place in the Commonwealth Convention Center and the Hyatt Regency Louisville.

Committee on the Agenda for Business Meetings
The Society has a Committee on the Agenda for Business Meetings. The purpose is to make Business Meetings orderly and effective. The committee does not have legal or administrative power. It is intended that the committee consider what may be called “quasi-political” motions. The committee has several possible courses of action on a proposed motion, including but not restricted to:

- (a) doing nothing;
- (b) conferring with supporters and opponents to arrive at a mutually accepted amended version to be circulated in advance of the meeting;
- (c) recommending and planning a format for debate to suggest to a Business Meeting;
- (d) recommending referral to a committee;
- (e) recommending debate followed by referral to a committee.

There is no mechanism that requires automatic submission of a motion to the committee. However, if a motion has not been submitted through the committee, it may be thought reasonable by a Business Meeting to refer it rather than to act on it without benefit of the advice of the committee.

The committee consists of Everett Pitcher (chairman), Marian B. Pour-El, David A. Sanchez, and Guido L. Weiss.

In order that a motion for the Business Meeting of January 26, 1984 receive the service offered by the committee in the most effective manner, it should have been in the hands of the secretary by December 27, 1983.

Everett Pitcher, Secretary


<table>
<thead>
<tr>
<th>Time</th>
<th>American Mathematical Society</th>
<th>Mathematical Association of America</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 a.m. - 11:50 a.m.</td>
<td><strong>SPECIAL SESSIONS</strong> Function Theoretic Operator Theory I</td>
<td></td>
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<tr>
<td>9:00 a.m. - 11:50 a.m.</td>
<td>Partial Differential Operators I</td>
<td></td>
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<tr>
<td>9:15 a.m. - 11:55 a.m.</td>
<td><strong>SESSIONS FOR CONTRIBUTED PAPERS</strong> Convergence and Approximation Theory</td>
<td></td>
</tr>
<tr>
<td>9:30 a.m. - 11:55 a.m.</td>
<td>Geometry and Topology</td>
<td></td>
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<tr>
<td>9:45 a.m. - 11:55 a.m.</td>
<td>Operator Theory (Abstract)</td>
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<tr>
<td>9:45 a.m. - 11:55 a.m.</td>
<td>Ordered Algebraic Structures</td>
<td></td>
</tr>
<tr>
<td>10:00 a.m. - 11:50 a.m.</td>
<td><strong>SPECIAL SESSION</strong> Ill-posed Problems I</td>
<td></td>
</tr>
<tr>
<td>10:15 a.m. - 11:15 a.m.</td>
<td><strong>INVITED ADDRESS</strong> Design and analysis of self-adjusting data structures Robert E. Tarjan</td>
<td></td>
</tr>
<tr>
<td>10:45 a.m. - 11:55 a.m.</td>
<td><strong>SESSIONS FOR CONTRIBUTED PAPERS</strong> Fields, Rings and Modules</td>
<td></td>
</tr>
<tr>
<td>1:00 p.m. - 2:00 p.m.</td>
<td><strong>COLLOQUIUM LECTURES</strong> Lecture I: On the arithmetic of curves Barry Mazur</td>
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<tr>
<td>1:00 p.m. - 5:00 p.m.</td>
<td><strong>SESSIONS FOR CONTRIBUTED PAPERS</strong></td>
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<tr>
<td>1:15 p.m. - 5:10 p.m.</td>
<td>Functional Analysis</td>
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<tr>
<td>1:15 p.m. - 3:40 p.m.</td>
<td>Operator Theory (Hard-core)</td>
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<tr>
<td>1:15 p.m. - 5:10 p.m.</td>
<td>Classes of Complex-valued Functions</td>
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<tr>
<td>2:05 p.m. - 5:35 p.m.</td>
<td><strong>SPECIAL SESSION</strong></td>
<td></td>
</tr>
<tr>
<td>2:15 p.m. - 3:15 p.m.</td>
<td><strong>INVITED ADDRESS</strong> Segal's Burnside ring conjecture Gunnar Carlsson</td>
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<tr>
<td>2:15 p.m. - 6:05 p.m.</td>
<td><strong>SESSIONS FOR CONTRIBUTED PAPERS</strong></td>
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<tr>
<td>2:15 p.m. - 5:05 p.m.</td>
<td>Function Theoretic Operator Theory II</td>
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<tr>
<td>2:15 p.m. - 4:35 p.m.</td>
<td>Partial Differential Operators II</td>
<td></td>
</tr>
<tr>
<td>2:15 p.m. - 6:05 p.m.</td>
<td>Ill-posed Problems II</td>
<td></td>
</tr>
<tr>
<td>2:15 p.m. - 5:05 p.m.</td>
<td>Ring Theory I</td>
<td></td>
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<tr>
<td>2:15 p.m. - 5:05 p.m.</td>
<td>Commutative Algebra II</td>
<td></td>
</tr>
<tr>
<td>2:30 p.m. - 3:25 p.m.</td>
<td><strong>SESSIONS FOR CONTRIBUTED PAPERS</strong> Generalized Integration Theory</td>
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</tr>
<tr>
<td>2:30 p.m. - 3:40 p.m.</td>
<td>Surfaces and Curves</td>
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<tr>
<td>2:30 p.m. - 3:55 p.m.</td>
<td>History, Pedagogy and Topics in Undergraduate Mathematics</td>
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<tr>
<td>2:30 p.m. - 5:40 p.m.</td>
<td>Algebraic Structures</td>
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<tr>
<td>2:45 p.m. - 5:35 p.m.</td>
<td><strong>SPECIAL SESSION</strong></td>
<td></td>
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<tr>
<td></td>
<td>Incompressible Fluid Flow I</td>
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</tbody>
</table>
should check with the Minicourse Cashier one hour prior to the Minicourse to see if any openings have occurred.

If the only reason for registering for the Joint Meetings is to gain admission to a Minicourse, this should have been indicated by checking the appropriate box on the preregistration form. Then, if the minicourse is full, full refund can be made of the Joint Mathematics Meetings preregistration fees. Otherwise, the Joint Meetings preregistration will be processed, and then be subject to the 50 percent refund rule.

Other MAA Sessions

There will be a Panel Discussion at 11:00 a.m. on Friday, January 27. The moderator is JOAN LEITZEL of Ohio State University. The topic is Issues in remediation.

The Committee on Corporate Members will hold a session at 10:00 a.m. on Saturday, January 28. The moderator is JERRY LYONS of Prindle, Weber and Schmidt. The topic is Mathematics publishing, copyright, and software. Speakers include Carol Rischer and Robert Sickles.

There will be a Panel Discussion at 11:00 a.m. on Saturday, January 28. The moderator is MARTHA SIEGEL of Towson State University. The topic is Beginning integration: Calculus and discrete mathematics in the first two years.

The Committee on Retraining for Computer Sciences will hold a Panel Discussion at 3:30 p.m. on Saturday, January 28. The moderator is DONALD L. KREIDER of Dartmouth College. The topic is Progress report on the Clarkson Institute for Retraining in Computer Sciences Conducted Under the Auspices of the Joint ACM/MAA Committee on Retraining for Computer Sciences.

Business Meeting

The Business Meeting of the MAA will take place at noon on Friday, January 27, at which the 1984 Award for Distinguished Service, the Chauvenet Prize, and the Lester R. Ford Awards for expository writing will be presented.

Board of Governors

The MAA Board of Governors will meet at 9:00 a.m. on Thursday, January 26.

Section Officers

There will be a Section Officers’ meeting at 4:00 p.m. on Friday, January 27.

ACTIVITIES OF OTHER ORGANIZATIONS

The Association for Women in Mathematics (AWM) will sponsor a Panel Discussion on Lipman Bers, a mathematics mentor at 11:15 a.m. on Thursday, January 26. Speakers include Jozef Dodziuk, Jane P. Gilman, Linda Keen (moderator), Irwin Kra, Tilla Klotz Milnor, and Lesley Sibner. The AWM Business Meeting will follow the Panel Discussion at 12:30 p.m.

A party is being planned for Thursday evening, January 26, in the Pool Area on the fourth floor of the Hyatt Regency Louisville.

The fifth annual AWM Emmy Noether Lecture will be given at 10:00 a.m. on Friday, January 27, by MARY ELLEN RUDIN. Her title is Paracompactness.

The National Association of Mathematicians (NAM) will receive the William W. S. Claytor Lecture at 10:15 a.m. on Thursday, January 26, from A. T. BHRUCHA-REID, who will speak on Some notions and applications in probability theory—numerical methods.

NAM will sponsor a Panel Discussion titled Some approaches for providing computer literacy for students in small colleges and universities at 11:15 a.m. on Friday, January 27. The list of speakers includes Melvis Atkinson, Samuel H. Douglas (moderator), Henry L. Hardy, John Harris, and Nelloise Watkins.

The NAM Business Meeting will take place at 1:30 p.m. on Friday, January 27.

The National Science Foundation (NSF) will sponsor an address on Thursday, January 26 at 2:15 p.m. The speaker is JUDITH S. SUNLEY, Acting Deputy Division Director, Mathematical Sciences Division of NSF; her title is The Mathematical Sciences at the National Science Foundation.

The NSF will again be represented at a booth in the exhibit area. NSF staff members will be available to provide counsel and information on NSF programs of interest to mathematicians from 9:00 a.m. to 5:00 p.m., Thursday and Friday, January 26–27.

The Rocky Mountain Mathematics Consortium (RMMC) will sponsor a symposium on The mathematics of large scale simulation at 2:15 p.m. on Friday, January 27. The symposium has been organized and will be moderated by A. DUANE PORTER of the University of Wyoming. The speakers are RICHARD EWING of the University of Wyoming (formerly of Mobil Oil Company) and THOMAS RUSSELL of Marathon Oil Company. The speakers will discuss several mathematical aspects of large scale simulation. First, various physical models leading to mathematical models which require significant computational effort will be introduced. Then some techniques for discretizing these coupled systems of partial differential equations will be surveyed. Certain difficulties found in current simulators will be discussed and new methods to alleviate these difficulties will be presented. Finally, various linearization and linear solution techniques for large scale problems will be considered.

The RMMC Board of Directors will meet at 2:00 p.m. on Thursday, January 26.

OTHER EVENTS OF INTEREST

A National Meeting of Department Chairmen

Sponsored by the Joint Concerns Committee for Mathematics, the AMS, MAA, and the Society for
## TIMETABLE

<table>
<thead>
<tr>
<th>WEDNESDAY, January 25</th>
<th>American Mathematical Society</th>
<th>Mathematical Association of America</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:30 p.m. - 4:30 p.m.</td>
<td>INVITED ADDRESS</td>
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<tr>
<td></td>
<td>Some recent results concerning minimal surfaces</td>
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<td></td>
<td>Leon Simon</td>
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<tr>
<td>4:45 p.m. - 5:45 p.m.</td>
<td>SPECIAL INVITED ADDRESS</td>
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<tr>
<td></td>
<td>Maximizing the impact of mathematics</td>
<td>Edward E. David, Jr., President of Exxon Research and Engineering</td>
</tr>
<tr>
<td>8:30 p.m. - 9:30 p.m.</td>
<td>JOSIAH WILLARD GIBBS LECTURE</td>
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<td></td>
<td>Computer programs that model the process of scientific and mathematical discovery</td>
<td>Herbert A. Simon</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>THURSDAY, January 26</th>
<th>AMS</th>
<th>MAA and Other Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 a.m. - 4:00 p.m.</td>
<td>REGISTRATION</td>
<td></td>
</tr>
<tr>
<td>8:00 a.m. - 4:00 p.m.</td>
<td>AMS BOOK SALE</td>
<td>MAA BOOK SALE</td>
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<tr>
<td></td>
<td>SPECIAL SESSIONS</td>
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<tr>
<td>8:30 a.m. - 11:50 a.m.</td>
<td>Commutative Algebra III</td>
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<tr>
<td>8:30 a.m. - 11:50 a.m.</td>
<td>Semigroup Theory I</td>
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<tr>
<td>8:30 a.m. - 11:55 a.m.</td>
<td>Differential Equations and Boundary Values I</td>
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<tr>
<td>8:30 a.m. - 9:40 a.m.</td>
<td>Logic and Foundations</td>
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<tr>
<td>8:30 a.m. - 11:55 a.m.</td>
<td>Differential Equations</td>
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<tr>
<td>8:30 a.m. - 12:30 p.m.</td>
<td>Stochastic Processes</td>
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<tr>
<td>8:30 a.m. - 10:30 a.m.</td>
<td>MAA - MINICOURSE #2</td>
<td>Discrete algorithmic mathematics</td>
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<td></td>
<td>Stephen B. Maurer</td>
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<tr>
<td>8:45 a.m. - 10:40 a.m.</td>
<td>SESSION FOR CONTRIBUTED PAPERS</td>
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<tr>
<td>9:00 a.m. - 9:30 a.m.</td>
<td>EMPLOYMENT REGISTER ORIENTATION SESSION</td>
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<tr>
<td>9:00 a.m. - 10:00 a.m.</td>
<td>INVITED ADDRESS</td>
<td>Vorticity and fluid dynamics</td>
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<td>Andrew Majda</td>
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<tr>
<td>9:00 a.m. - 12:20 p.m.</td>
<td>SPECIAL SESSIONS</td>
<td>Ring Theory II</td>
</tr>
<tr>
<td>9:00 a.m. - 11:50 a.m.</td>
<td>Random Walks on Finite Groups</td>
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<tr>
<td>9:00 a.m. - 11:50 a.m.</td>
<td>Ordered Algebraic Structures I</td>
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<tr>
<td>9:00 a.m. - 11:50 a.m.</td>
<td>Partial Differential Operators III</td>
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<tr>
<td>9:00 a.m. - 4:00 p.m.</td>
<td>MAA - BOARD OF GOVERNORS MEETING</td>
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</tr>
<tr>
<td>9:00 a.m. - 5:00 p.m.</td>
<td>EXHIBITS</td>
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<tr>
<td>9:30 a.m. - 4:00 p.m.</td>
<td>EMPLOYMENT REGISTER REGISTRATION</td>
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<tr>
<td>9:30 a.m. - 11:50 a.m.</td>
<td>SPECIAL SESSION</td>
<td>Homotopy Theory II</td>
</tr>
</tbody>
</table>
Petition Table

At the request of the AMS Committee on Human Rights of Mathematicians, a table will be made available in the meeting registration area at which petitions on behalf of named individual mathematicians suffering from human rights violations may be displayed and signed by meeting participants acting in their individual capacities.

Signs of moderate size may be displayed at the table, but must not represent that the case of the individual in question is backed by the Committee on Human Rights unless it has, in fact, so voted. Volunteers may be present at the table to provide information on individual cases, but notice must be sent at least seven (7) days in advance of the meeting to the Meetings Department in Providence (telephone 401-272-9500). Since space is limited, it may also be necessary to limit the number of volunteers present at the table at any one time. The Committee on Human Rights may delegate a person to be present at the table at any or all times, taking precedence over other volunteers.

Any material which is not a petition (e.g., advertisements, résumés) will be removed by the staff. When registration closes, any material on the table will be discarded, so individuals placing petitions on the table should be sure to remove them prior to the close of registration.

Industrial and Applied Mathematics, this meeting is intended to be a step towards discussion of issues relating to the revitalization of mathematics and mathematics departments. The program is still in the formative stage, but likely topics include the recruiting of mathematicians, the development of a database for mathematics departments, the report of the Committee on Resources for the Mathematical Sciences, the relationship between mathematics and computer science, and the need for an agenda for future meetings of chairmen. The organizing committee members are David Ballew, Felix Browder, Paul Davis, Bernard Madison (chairman), Robert O'Malley, and William Trotter.

Book Sales

Books published by the AMS and MAA will be sold for cash prices somewhat below the usual prices when these same books are sold by mail. These discounts will be available only to registered participants wearing the official meeting badge. Visa and MasterCard credit cards will be accepted for book sale purchases at the meeting. The book sales will be open the same days and hours as the Joint Mathematics Meetings registration desk (except on Saturday, January 28, when they will close at 2:00 p.m.) and are located in Exhibit Space C of the Commonwealth Convention Center.

Exhibits

The book and educational media exhibits are located in Exhibit Space C of the Commonwealth Convention Center and will be open Wednesday, January 25, through Saturday, January 28. The exhibits will be open from 1:00 p.m. to 5:00 p.m. on Wednesday; from 9:00 a.m. to 5:00 p.m. on Thursday and Friday; and from 9:00 a.m. to noon on Saturday. All participants are encouraged to visit the exhibits during the meeting. Participants visiting the exhibits will be asked to display their meeting badge in order to enter the exhibit area.

MATHFILE

MATHFILE, the computerized version of Mathematical Reviews, will be demonstrated in the exhibit area during regular registration hours. Sample literature searches on material published in MR since 1973 will be performed on request, with printed results available in minutes. MATHFILE is available through two U.S. online vendors, BRS and DIALOG. In addition, the European vendors SAMSOM Data Systemen and the European Space Agency (ESA) will offer MATHFILE, with access from the U.S. at comparable telecommunication rates.

Rare Book Exhibit

The University of Louisville (Belknap Campus) will mount an exhibition of rare books from the William Marshall Bullitt Collection of Mathematics and Astronomy in the Department of Rare Books on the ground floor of the Ekstrom Library. The library is approximately 20 blocks south of the Commonwealth Convention Center, off Third Street. Directions for reaching the university campus can be obtained at the Local Information Section of the meetings registration desk. Those interested are invited to view the exhibition between 9:00 a.m. and 6:00 p.m., Wednesday through Friday.

ACCOMMODATIONS

Hotels

The rates listed below are subject to a 5 percent sales tax and a 4.2 percent occupancy tax. The number after the name of the hotel is the number it carries on the map. The estimated walking distance from the hotel to the Commonwealth Convention Center is given in parentheses following the telephone number.

Reservations at these hotels cannot be made by calling the hotel directly until after January 15, 1984. Also, after that date, the rates below may not apply.

In all cases “single” refers to one person in one bed; “double” refers to two persons in one bed; “twin” refers to two persons in two single beds; and “twin double” refers to two persons in two double beds. A rollaway cot for an extra
<table>
<thead>
<tr>
<th>THURSDAY, January 26</th>
<th>American Mathematical Society</th>
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</tr>
</thead>
<tbody>
<tr>
<td>9:30 a.m. - 11:55 a.m.</td>
<td><strong>SESSIONS FOR CONTRIBUTED PAPERS</strong></td>
<td>Topologized Algebraic Structures</td>
</tr>
<tr>
<td>9:50 a.m. - noon</td>
<td>Graph Theory</td>
<td>WILLIAM S. CLAYTOR LECTURE</td>
</tr>
<tr>
<td>10:15 a.m. - 11:15 a.m.</td>
<td>SESSION FOR CONTRIBUTED PAPERS</td>
<td>Control Theory</td>
</tr>
<tr>
<td>11:00 a.m. - 11:55 a.m.</td>
<td>COLLOQUIUM LECTURES</td>
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<tr>
<td>11:15 a.m. - 12:30 p.m.</td>
<td>Lecture II: On the arithmetic of curves</td>
<td>Barry Mazur</td>
</tr>
<tr>
<td>12:30 p.m. - 12:55 p.m.</td>
<td>Rocky Mountain Mathematics Consortium</td>
<td>BOARD OF DIRECTORS MEETING</td>
</tr>
<tr>
<td>1:00 p.m. - 2:00 p.m.</td>
<td>The Mathematical Sciences at the National Science Foundation</td>
<td>Judith S. Sunley, NSF</td>
</tr>
<tr>
<td>2:00 p.m. - 4:00 p.m.</td>
<td><strong>BÖCHER PRIZE SESSION AND BUSINESS MEETING</strong></td>
<td></td>
</tr>
<tr>
<td>4:00 p.m. - 6:00 p.m.</td>
<td>Joint Concerns Committee for Mathematics</td>
<td>A National Meeting of Department Chairmen</td>
</tr>
<tr>
<td>6:05 p.m.</td>
<td>Discrete algorithmic mathematics</td>
<td>Stephen B. Maurer</td>
</tr>
<tr>
<td>7:00 p.m. - 10:00 p.m.</td>
<td>MAA - MINICOURSE #3</td>
<td>Teaching problem solving</td>
</tr>
<tr>
<td>7:30 p.m. - 9:30 p.m.</td>
<td>MAA - MINICOURSE #7</td>
<td>CONDUIT microcomputer software</td>
</tr>
<tr>
<td>FRIDAY, January 27</td>
<td>REGISTRATION</td>
<td>AMS BOOK SALE</td>
</tr>
<tr>
<td>8:00 a.m. - 10:00 a.m.</td>
<td>AMS BOOK SALE</td>
<td>MAA and Other Organizations</td>
</tr>
<tr>
<td>8:00 a.m. - 4:00 p.m.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Commonwealth Convention Center  
2. Galt House  
3. Rodeway Inn  
4. Howard Johnson's  
5. Best Western-Midtown  
6. Louisville TraveLodge  
7. Hyatt Regency Louisville  
8. Seelbach Hotel  
9. The Louisville Inn
### TIMETABLE

<table>
<thead>
<tr>
<th>Time</th>
<th>American Mathematical Society</th>
<th>Other Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 a.m. - 5:00 p.m.</td>
<td><strong>EXHIBITS</strong></td>
<td></td>
</tr>
<tr>
<td>9:00 a.m. - 9:50 a.m.</td>
<td><strong>EMPLOYMENT REGISTER DISTRIBUTION OF SCHEDULES</strong></td>
<td></td>
</tr>
<tr>
<td>9:00 a.m. - 9:50 a.m.</td>
<td><strong>MAA - INVITED ADDRESS</strong></td>
<td>Some examples of combinatorial averaging Herbert S. Wilf</td>
</tr>
<tr>
<td>9:30 a.m. - 5:30 p.m.</td>
<td><strong>EMPLOYMENT REGISTER INTERVIEWS</strong></td>
<td></td>
</tr>
<tr>
<td>10:00 a.m. - 10:50 a.m.</td>
<td><strong>MAA - INVITED ADDRESS</strong></td>
<td>The computer as a grader Melvin Maron</td>
</tr>
<tr>
<td>11:00 a.m. - 11:50 a.m.</td>
<td><strong>MAA - PANEL DISCUSSION</strong></td>
<td>Issues in remediation Joan Leitzel (moderator)</td>
</tr>
<tr>
<td>11:00 a.m. - 11:50 a.m.</td>
<td><strong>MAA - INVITED ADDRESS</strong></td>
<td>Computational geometry: Paradigms and applications Frances Yao</td>
</tr>
<tr>
<td>11:15 a.m. - 12:30 p.m.</td>
<td><strong>NAM - PANEL DISCUSSION</strong></td>
<td>Some approaches for providing computer literacy for students in small colleges and universities Melvis Atkinson Samuel H. Douglas (moderator) Henry L. Hardy John Harris Nelloise Watkins</td>
</tr>
<tr>
<td>12:00 p.m. - 12:50 p.m.</td>
<td><strong>MAA - BUSINESS MEETING</strong></td>
<td></td>
</tr>
<tr>
<td>1:00 p.m. - 2:00 p.m.</td>
<td><strong>COLLOQUIUM LECTURES</strong></td>
<td></td>
</tr>
<tr>
<td>1:00 p.m. - 4:20 p.m.</td>
<td><strong>SPECIAL SESSIONS</strong></td>
<td></td>
</tr>
<tr>
<td>1:00 p.m. - 4:20 p.m.</td>
<td><strong>Partial Differential Equations and Optimal Control Problems I</strong></td>
<td></td>
</tr>
<tr>
<td>1:00 p.m. - 4:20 p.m.</td>
<td><strong>Ordered Algebraic Structures II</strong></td>
<td></td>
</tr>
<tr>
<td>1:00 p.m. - 5:20 p.m.</td>
<td><strong>Semigroup Theory II</strong></td>
<td></td>
</tr>
<tr>
<td>1:00 p.m. - 4:50 p.m.</td>
<td><strong>III-Posed Problems III</strong></td>
<td></td>
</tr>
<tr>
<td>1:00 p.m. - 3:00 p.m.</td>
<td><strong>Partial Differential Operators IV</strong></td>
<td></td>
</tr>
<tr>
<td>1:00 p.m. - 3:00 p.m.</td>
<td><strong>MAA - MINICOURSE #5</strong></td>
<td>Problems from industry Jeanne L. Agnew Marvin S. Keener</td>
</tr>
<tr>
<td>1:00 p.m. - 3:00 p.m.</td>
<td><strong>MAA - MINICOURSE #6</strong></td>
<td>Applications of computer graphics Joan Wyzkoski</td>
</tr>
</tbody>
</table>
person can be added to double or twin rooms only; however, not all hotels are willing to do so.

Please make all changes to or cancellations of hotel reservations with the Mathematics Meetings Housing Bureau in Providence before January 15, 1984. The telephone number in Providence is 401-272-9500 (extension 239). After that date, changes or cancellations should be made with the Louisville Convention and Visitors Bureau by calling 502-584-2144.

Best Western-Midtown (5)
200 E. Liberty
Louisville, Kentucky 40202
Telephone: 502-589-6410 (11 minutes)
- Singles $25
- Twin Double $31
- Triples $35
- Quads $39

**Personal checks and major credit cards will be accepted for room deposits and payment of balance due; travelers’ checks will also be accepted at time of check-out.**

Galt House (2)
On the River at Fourth
Louisville, Kentucky 40202
Telephone: 502-589-5200 (4 minutes)
- Singles $40
- Doubles $43
- Twin Double $43
- Triples $46
- Quads $48
- Parlor Suite $110

**Personal checks and major credit cards will be accepted for room deposits and payment of balance due; however, if a personal check is used, it must be accompanied by credit card identification.**

Howard Johnson’s (4)
100 East Jefferson Street
Louisville, Kentucky 40202
Telephone: 502-582-2481 (8 minutes)
- Singles $38
- Doubles $44
- Twin Doubles $44
- Triples $50
- Quads $56

**Personal checks, travelers’ checks, and major credit cards will be accepted for room deposits and payment of balance due.**

Hyatt Regency Louisville (7)
320 West Jefferson Street
Louisville, Kentucky 40202
Telephone: 502-587-3434 (2 minutes)
- Singles $50
- Double $59
- Twin/Twin Doubles $59
- Triples $67
- Quads $74

**Personal checks and major credit cards will be accepted for room deposits and payment of balance due; however, if a personal check is used, it must be accompanied by credit card identification.**

The Louisville Inn (9)
120 West Broadway
Louisville, Kentucky 40202
Telephone: 502-582-2241 (15 minutes)
- Singles $38
- Twin/Twin Double $46
- Triples $52
- Quads $58
- Parlor/Bedroom $85

**Transportation to the Commonwealth Convention Center will be available upon request at no charge.**

**Personal checks and major credit cards will be accepted for room deposits and payment of balance due; however, if a personal check is used, it must be accompanied by credit card identification.**

Rodeway Inn (3)
101 East Jefferson Street
Louisville, Kentucky 40202
Telephone: 502-585-2200 (8 minutes)
- Singles $43
- Double $49
- Twin Doubles $49
- Triples $49
- Quads $49

**Transportation to the Commonwealth Convention Center will be available upon request at no charge.**

**Personal checks and major credit cards will be accepted for room deposits and payment of balance due; however, if a personal check is used, it must be accompanied by credit card identification.**

Seelbach Hotel (8)
500 Fourth Avenue
Louisville, Kentucky 40202
Telephone: 502-585-3200 (4 minutes)
- Singles $48
- Doubles $54
- Twin/Twin Doubles $54
- Triples $60
- Quads $66
- One-bedroom suite $100
- Two-bedroom suite $250

**Personal checks, American Express and Visa credit cards will be accepted in payment of room deposits; balance due is payable on check-out in cash, major credit cards or travelers’ checks. Personal checks will be accepted at check-out subject to prior approval.**

Louisville Travelodge (6)
401 South Second Street
Louisville, Kentucky 40202
Telephone: 502-583-2841 (10 minutes)
- Singles $33
- Doubles $38
- Twin Doubles $43
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:15 p.m.</td>
<td>SESIONS FOR CONTRIBUTED PAPERS</td>
</tr>
<tr>
<td></td>
<td>Set-Theoretic Topology</td>
</tr>
<tr>
<td>1:15 p.m.</td>
<td>Polynomials and Generalizations</td>
</tr>
<tr>
<td>1:15 p.m.</td>
<td>Number Theory</td>
</tr>
<tr>
<td>1:15 p.m.</td>
<td>Stability, Theory and Mathematical Physics</td>
</tr>
<tr>
<td>1:30 p.m.</td>
<td>Incompressible Fluid Flow</td>
</tr>
<tr>
<td>1:30 p.m.</td>
<td>NAM - BUSINESS MEETING</td>
</tr>
<tr>
<td>2:00 p.m.</td>
<td>MAA - MINICOURSE #1</td>
</tr>
<tr>
<td></td>
<td>Linear programming</td>
</tr>
<tr>
<td></td>
<td>Charles E. Haff</td>
</tr>
<tr>
<td>2:00 p.m.</td>
<td>MAA - MINICOURSE #4</td>
</tr>
<tr>
<td></td>
<td>Applications of discrete mathematics</td>
</tr>
<tr>
<td></td>
<td>Fred S. Roberts</td>
</tr>
<tr>
<td>2:15 p.m.</td>
<td>INVITED ADDRESS</td>
</tr>
<tr>
<td></td>
<td>Card shuffling and group representations</td>
</tr>
<tr>
<td></td>
<td>Persi Diaconis</td>
</tr>
<tr>
<td>2:15 p.m.</td>
<td>SESSION FOR CONTRIBUTED PAPERS</td>
</tr>
<tr>
<td>2:15 p.m.</td>
<td>Manifolds</td>
</tr>
<tr>
<td>2:15 p.m.</td>
<td>RMMC - SYMPOSIUM</td>
</tr>
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<td></td>
<td>The mathematics of large scale simulation</td>
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<td></td>
<td>Richard Ewing</td>
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<tr>
<td></td>
<td>A. Duane Porter (moderator)</td>
</tr>
<tr>
<td></td>
<td>Thomas Russell</td>
</tr>
<tr>
<td>2:30 p.m.</td>
<td>SESION FOR CONTRIBUTED PAPERS</td>
</tr>
<tr>
<td>2:30 p.m.</td>
<td>Algebra</td>
</tr>
<tr>
<td>2:30 p.m.</td>
<td>Banach Spaces</td>
</tr>
<tr>
<td>3:15 p.m.</td>
<td>Applied Combinatorics and Game Theory</td>
</tr>
<tr>
<td>3:30 p.m.</td>
<td>INVITED ADDRESS</td>
</tr>
<tr>
<td></td>
<td>Group actions on rings and generalized inner automorphisms</td>
</tr>
<tr>
<td></td>
<td>M. Susan Montgomery</td>
</tr>
<tr>
<td>3:30 p.m.</td>
<td>SPECIAL SESSION</td>
</tr>
<tr>
<td>3:30 p.m.</td>
<td>Vector Field Systems and Control III</td>
</tr>
<tr>
<td>4:00 p.m.</td>
<td>MAA - SECTION OFFICERS MEETING</td>
</tr>
<tr>
<td>4:45 p.m.</td>
<td>Committee on Employment &amp; Educational Policy</td>
</tr>
<tr>
<td></td>
<td>PANEL DISCUSSION: The supply of mathematical science researchers in the</td>
</tr>
<tr>
<td></td>
<td>1990's</td>
</tr>
<tr>
<td></td>
<td>Lida K. Barrett (moderator)</td>
</tr>
<tr>
<td></td>
<td>Maureen McKeough</td>
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<tr>
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<td>James D. Stasheff</td>
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<td></td>
<td>Gail S. Young, Jr.</td>
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<tr>
<td></td>
<td>Wilson M. Zaring</td>
</tr>
<tr>
<td>7:00 p.m.</td>
<td>NO-HOST COCKTAIL PARTY</td>
</tr>
</tbody>
</table>

37
Delta and USAir, the two major carriers to Louisville, are making special round trip air fares available to the Joint Mathematics Meetings in Louisville, Kentucky, January 23–28, 1984.

Delta is offering a 30 percent discount on full round-trip coach fares. This special fare requires departure between January 23 and 27. Reservations and ticketing must be done at least seven days in advance and a maximum stay of 15 days will be permitted.

USAir is offering an unrestricted Super Saver fare to any participant purchasing tickets on its airline at least fourteen days in advance. Other fares will, of course, still be available after the fourteen-day limitation.

These special offers are available ONLY through the Louisville Meeting SuperPhone Exclusive.

Call SuperPhone toll-free today—800-556-6882—and save!!

(In Rhode Island and outside the Continental U.S. call 401-884-9500.)

Hours of Operation: 9:00 a.m. to 7:00 p.m. EST, Monday through Thursday, Fridays until 6:00 p.m.

Where discounts exceed 30 percent, they will be provided automatically through SuperPhone’s FARE CHECK system.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Triples</td>
<td>$48</td>
</tr>
<tr>
<td>Quads</td>
<td>$53</td>
</tr>
</tbody>
</table>

No personal checks will be accepted as payment for room deposit or balance of room charges; however, all major credit cards, money orders, and travelers’ checks will be honored.

The AMS-MAA Joint Meetings Committee always endeavors to obtain the lowest possible sleeping room rates for participants at annual meetings. The Committee is also responsible for maintaining a sound fiscal position for these meetings, and, until recently, has been able to keep the deficits at a reasonable level, while still providing the very best meeting facilities available to the participants.

As the meetings have grown in scope and complexity over the years, however, it has become necessary to find larger facilities with more and more session rooms. For this reason, the meetings in Louisville will take place in the Commonwealth Convention Center. Unfortunately, the cost of this excellent facility is higher than can be covered by the registration fees, and the Committee has arranged for most of the hotels in Louisville to collect an extra $3 per room per night from participants, which will be used to offset the rental cost of the Center. (The rates above include this extra charge where applicable.) The Committee hopes that these extra funds will not be necessary at future annual meetings, and therefore chose this method over an increase in the registration fees.

Registration at the Meetings

Meeting preregistration and registration fees only partially cover expenses of holding meetings. All mathematicians who wish to attend sessions are expected to register, and should be prepared to show their meeting badge, if so requested. The fees for Joint Meetings registration at the meeting (listed below) are 30 percent more than the preregistration fees.

**Joint Mathematics Meetings**

<table>
<thead>
<tr>
<th>Category</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Member of AMS, MAA</td>
<td>$61</td>
</tr>
<tr>
<td>Emeritus Member of AMS, MAA</td>
<td>$15</td>
</tr>
<tr>
<td>Nonmember</td>
<td>$93</td>
</tr>
<tr>
<td>Student/Unemployed</td>
<td>$15</td>
</tr>
</tbody>
</table>

**Employment Register**

- Employer $75
- Applicant No charge

**AMS Short Course**

- Student/Unemployed $10
- All Other Participants $30
- One-day Fee (Second Day Only) $15

**MAA Minicourses #1 through #8**

- All Participants $20 each

Registration fees may be paid at the meetings in cash, by personal or travelers’ check, or by Visa or MasterCard credit card. Canadian checks must be marked for payment in U.S. funds.

There is no extra charge for members of the families of registered participants, except that all professional mathematicians who wish to attend sessions must register independently.

All full-time students currently working toward a degree or diploma qualify for the student registration fees, regardless of income.
<table>
<thead>
<tr>
<th>Time</th>
<th>American Mathematical Society</th>
<th>Mathematical Association of America and Other Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 a.m. - 8:55 a.m.</td>
<td>MAA - FILM PROGRAM Challenge in the classroom (a film about the late R. L. Moore)</td>
<td></td>
</tr>
<tr>
<td>8:00 a.m. - 2:00 p.m.</td>
<td>AMS BOOK SALE</td>
<td>MAA BOOK SALE</td>
</tr>
<tr>
<td>8:00 a.m. - 4:00 p.m.</td>
<td>REGISTRATION</td>
<td></td>
</tr>
<tr>
<td>9:00 a.m. - 9:50 a.m.</td>
<td>MAA - RETIRING PRESIDENTIAL ADDRESS Reflections on the mystique of R. L. Moore Richard D. Anderson</td>
<td></td>
</tr>
<tr>
<td>9:00 a.m. - 11:00 a.m.</td>
<td>MAA - MINICOURSE #3 Teaching problem solving Alan H. Schoenfeld</td>
<td></td>
</tr>
<tr>
<td>9:00 a.m. - 11:00 a.m.</td>
<td>MAA - MINICOURSE #7 CONDUIT microcomputer software David A. Smith</td>
<td></td>
</tr>
<tr>
<td>9:00 a.m. - noon</td>
<td>EXHIBITS</td>
<td></td>
</tr>
<tr>
<td>9:00 a.m.</td>
<td>EMPLOYMENT REGISTER DISTRIBUTION OF SCHEDULES</td>
<td></td>
</tr>
<tr>
<td>9:30 a.m. - 5:30 p.m.</td>
<td>EMPLOYMENT REGISTER INTERVIEWS</td>
<td></td>
</tr>
<tr>
<td>10:00 a.m. - 10:50 a.m.</td>
<td>MAA - INVITED ADDRESS Beta and gamma functions from Euler to Selberg and beyond Richard A. Askey</td>
<td></td>
</tr>
<tr>
<td>10:00 a.m. - 10:50 a.m.</td>
<td>MAA - Committee on Corporate Members SESSION on Mathematics publishing, copyright, and software Jerry Lyons (moderator) Carol Rischer Robert Sickles</td>
<td></td>
</tr>
<tr>
<td>11:00 a.m. - 11:50 a.m.</td>
<td>MAA - INVITED ADDRESS Nonexpansive maps Andrew M. Gleason</td>
<td></td>
</tr>
<tr>
<td>11:00 a.m. - 12:50 p.m.</td>
<td>MAA - PANEL DISCUSSION Beginning integration: Calculus and discrete mathematics in the first two years Martha Siegel (moderator)</td>
<td></td>
</tr>
<tr>
<td>11:00 a.m. - 1:00 p.m.</td>
<td>MAA - MINICOURSE #8 NonCONDUIT microcomputer software David A. Smith</td>
<td></td>
</tr>
<tr>
<td>noon - 12:50 p.m.</td>
<td>MAA - INVITED ADDRESS Turning good mathematics into good TV Donald Berman Ross L. Finney</td>
<td></td>
</tr>
<tr>
<td>1:00 p.m. - 2:00 p.m.</td>
<td>COLLOQUIUM LECTURES Lecture IV: On the arithmetic of curves Barry Mazur</td>
<td></td>
</tr>
<tr>
<td>1:00 p.m. - 4:20 p.m.</td>
<td>Partial Differential Equations and Optimal Control Problems II</td>
<td></td>
</tr>
<tr>
<td>1:00 p.m. - 3:50 p.m.</td>
<td>Ordered Algebraic Structures III</td>
<td></td>
</tr>
<tr>
<td>1:00 p.m. - 4:20 p.m.</td>
<td>Semigroup Theory III</td>
<td></td>
</tr>
</tbody>
</table>
The unemployed status refers to any person currently unemployed, actively seeking employment, and who is not a student. It is not intended to include any person who has voluntarily resigned or retired from his or her latest position.

Persons who qualify for emeritus membership in either the Society or the Association may register at the emeritus member rate. The emeritus status refers to any person who has been a member of the AMS or MAA for twenty years or more, and is retired on account of age from his or her latest position.

Nonmembers who register at the meetings and pay the $93 nonmember registration fee are entitled to a discount of the difference between the member registration fee of $61 and the nonmember registration fee of $93 as a $32 credit against dues in either the AMS or MAA or both, provided they apply for membership before February 29, 1984.

Nonmember students who register at the meetings and pay the $15 registration fee are entitled to a discount of the difference between the student preregistration fee of $12 and the registration fee of $15 as a $3 credit against dues in either the AMS or MAA or both, provided they apply for membership before February 29, 1984.

Nonmembers and nonmember students who thus qualify may apply for membership at the meetings, or by mail afterward up to the deadline.

### Dates and Times

**AMS Short Course**
Prefunction Room, Regency Ballroom South
Hyatt Regency Louisville
Monday, January 23
11:00 a.m. to 4:00 p.m.
Tuesday, January 24
8:00 a.m. to 2:00 p.m.

**Joint Mathematics Meetings**
Main Lobby, Commonwealth Convention Center
Tuesday, January 24
4:00 p.m. to 8:00 p.m.
Wednesday, January 25
8:00 a.m. to 5:00 p.m.
Thursday, January 26, through Saturday, January 28
8:00 a.m. to 4:00 p.m.

**Registration Desk Services**

**AMS/MAA Information**
Information on the publications and activities of both organizations may be obtained at this section of the registration desk.

**Assistance, Comments and Complaints**
A log for registering participants’ comments or complaints about the meeting is kept at the Transparencies section of the registration desk. All participants are encouraged to use this method of helping to improve future meetings. Comments on all phases of the meeting are welcome. If a written reply is desired, participants should furnish their name and address.

Participants with problems of an immediate nature requiring action at the meeting should see the meeting manager, who will try to assist them.

### Audio-Visual Assistance
A member of the AMS/MAA staff will be available to advise or consult with speakers on their audio-visual requirements.

Rooms where special sessions and contributed paper sessions will be held will be equipped with an overhead projector and screen. **Blackboards will not be available.**

### Baggage and Coat Check
Inquire at the meetings registration desk.

### Check Cashing
The meeting cashier will cash personal or travelers’ checks up to $50, upon presentation of the official meeting registration badge, provided there is enough cash on hand. Canadian checks must be marked for payment in U.S. funds.

### Local Information
This section of the desk will be staffed by members of the Local Arrangements Committee and other volunteers from the Louisville mathematical community.

### Lost and Found
See the meeting cashier.

### Mail
All mail and telegrams for persons attending the meetings should be addressed to the participant, c/o Joint Mathematics Meetings, Commonwealth Convention Center, 221 Fourth Avenue, Louisville, Kentucky 40202. Mail and telegrams so addressed may be picked up at the mailbox in the registration area during the hours the registration desk is open. U.S. mail not picked up will be forwarded after the meeting to the mailing address given on the participant’s registration record.

### Personal Messages
Participants wishing to exchange messages during the meeting should use the mailbox mentioned above. Message pads and pencils are provided. It is regretted that such messages left in the box cannot be forwarded to participants after the meeting is over.

### Telephone Messages
A telephone message center is located in the registration area to receive incoming calls for participants. The center is open from January 25 through 28 only, during the hours that the Joint Mathematics Meetings registration desk is open. Messages will be taken and the name of any individual for whom a message has been received will be posted until the message has been picked up at the message center. The telephone number of the message center is 502-584-4664.

### Transparencies
Speakers wishing to prepare transparencies in advance of their talk will find the necessary materials and copying machines at this section of the registration desk. A member of the staff will assist and advise speakers on the best procedures and
<table>
<thead>
<tr>
<th>SATURDAY, January 28</th>
<th>American Mathematical Society</th>
<th>Mathematical Association of America and Other Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:00 p.m. - 3:00 p.m.</td>
<td></td>
<td>MAA - MINICOURSE #6&lt;br&gt;Problems from industry&lt;br&gt;Jeanne L. Agnew&lt;br&gt;Marvin S. Keener</td>
</tr>
<tr>
<td>1:00 p.m. - 3:00 p.m.</td>
<td></td>
<td>MAA - MINICOURSE #6&lt;br&gt;Applications of computer graphics&lt;br&gt;Joan Wyzkoski</td>
</tr>
<tr>
<td>1:15 p.m. - 3:40 p.m.</td>
<td>SESSIONS FOR CONTRIBUTED PAPERS</td>
<td>Complexes and Cells</td>
</tr>
<tr>
<td>1:15 p.m. - 3:10 p.m.</td>
<td></td>
<td>Numerical Methods and Approximation Theory</td>
</tr>
<tr>
<td>1:15 p.m. - 2:40 p.m.</td>
<td></td>
<td>Banach Algebras</td>
</tr>
<tr>
<td>1:15 p.m. - 2:55 p.m.</td>
<td></td>
<td>Differential Equations and Boundary Values II</td>
</tr>
<tr>
<td>2:00 p.m. - 4:00 p.m.</td>
<td></td>
<td>MAA - MINICOURSE #4&lt;br&gt;Applications of discrete mathematics&lt;br&gt;Fred S. Roberts</td>
</tr>
<tr>
<td>2:15 p.m. - 3:15 p.m.</td>
<td>INVITED ADDRESS&lt;br&gt;Intersection homology and its applications&lt;br&gt;Robert D. MacPherson</td>
<td></td>
</tr>
<tr>
<td>3:30 p.m. - 5:30 p.m.</td>
<td></td>
<td>MAA - Committee on Retraining for Computer Sciences - PANEL, DISCUSSION; Progress report on the Clarkson Institute for Retraining in Computer Sciences conducted under the auspices of the Joint ACM/MAA Committee on Retraining for Computer Sciences&lt;br&gt;Donald L. Kreider (moderator)</td>
</tr>
</tbody>
</table>
methods for preparation of their material. There is a modest charge for these materials.

Visual Index
An alphabetical list of registered participants, including local addresses, arrival and departure dates, is maintained in the registration area.

MISCELLANEOUS INFORMATION

Child Care
We Sit Better, Inc., offers professional babysitting in hotel rooms. Day or evening service is available. Their present rate is minimum wage for a minimum of four hours, plus $3 carfare. Please notify them as far in advance as possible. For more information call 502-583-9618. Many of the listed hotels will arrange for a babysitter if given enough prior notice.

Local Information
Taxis presently cost $1.90 for the first mile and $1 for each additional mile. Each additional person is charged 30 cents extra, as long as they go from the same pickup point to the same destination. Fares from the airport to downtown hotels should average $9. The Transit Authority of River City (TARC) operates buses throughout the area. The fee is 60 cents during peak hours (6:30–8:30 a.m. and 3:30–5:30 p.m.) and 35 cents for nonpeak hours. A section of Fourth Avenue has been turned into a Galleria and pedestrian mall. Participants staying in downtown hotels will want to take advantage of the many shops in this area.

Louisville’s museums include the J. B. Speed Art Museum, the Museum of History and Science, the Howard Steamboat Museum and the Kentucky Derby Museum at Churchill Downs. The performing arts can be seen at Actors Theatre, Kentucky Center for the Arts, Macauley Theatre, and the Louisville Palace. Information on these and other points of visitor interest will be available at the Local Information section of the registration desk.

Parking
Parking lots within a few blocks of the Commonwealth Convention Center charge from 35 cents to 75 cents for one hour (50 cents median); twenty-four hour parking ranges from $1 to $3.50 ($3 median).

The Hyatt Regency Louisville has its own parking garage at Third Street and River City Mall at a daily charge of $3. This garage is also available for patrons of the Commonwealth Convention Center.

The Galt House has a 600-car parking lot which guests can use at no charge, with in and out privileges.

Social Events
The Local Arrangements Committee has arranged a no-host cocktail party for Friday, January 27, from 7:00 to 9:00 p.m., in the Regency Ballroom North at the Hyatt Regency Louisville.

Travel
In January, Louisville is on Eastern Standard Time. There is regular airline service to Standiford Field by several major airlines.

The airport in Louisville is approximately four miles from downtown and the trip takes about ten minutes. The airport limousine stops at the major downtown hotels, and runs every forty-five minutes from 7:00 a.m. until 11:00 p.m. daily. Present cost is $3.75 per person. A taxi from the airport to a downtown hotel costs about $8.50, plus 30 cents for each additional passenger one way. There is bus service provided by Transit Authority of River City (TARC) on bus #2 from the airport to downtown, with the fare varying between 35 cents and 60 cents depending on the hour of the day. Most major car rental agencies maintain desks at the airport. Louisville can be reached by car via I-65 from the North and South, I-64 from the East and West, and I-71 from the Northeast.

There is no passenger train service into Louisville; however, Greyhound and Trailways Bus Lines serve the Louisville area.

Weather
Louisville is located on the south bank of the Ohio River. The climate, while continental in type, is of a variable nature because of its position in the midlatitudes. The winters are moderately cold with temperatures rarely below 0°F. The mean temperature in January is 34°F while the average high temperature in January is 42°F and the average low temperature is 26°F. On rare occasions the winters in Louisville are extreme both in temperature and snowfall.

Important information on the Employment Register immediately follows.
Mathematical Sciences Employment Register

January Meeting in Louisville

The Mathematical Sciences Employment Register, held annually at the Joint Mathematics Meetings in January, provides opportunities for mathematical scientists seeking professional employment to meet employers who have positions to be filled. Job listings (or descriptions) and résumés prepared by employers and applicants are displayed for the participants so that members of each group may determine which members of the other group they would like to have an opportunity to interview. A computer program assigns the appointments, matching requests to the extent possible, using an algorithm which maximizes the number of interviews which can be scheduled subject to constraints determined by the number of time periods available, the numbers of applicants and employers, and the pattern of requests. The report below outlines the operation of the register, indicating some of the procedures involved for the benefit of those not familiar with its operation.

The Mathematical Sciences Employment Register is apparently unique among employment services offered by professional organizations in the sciences, engineering and the humanities. The computer programs used are constructed around a matching program, devised by Donald R. Morrison and based on an algorithm described in his paper “Matching Algorithms” in *Journal of Combinatorial Theory*, volume 6 (1969), pages 20 to 32; see also “Matching Algorithms” (abstract) * Notices, August 1967*, page 630. The number of interviews arranged by the program is significantly greater than the number possible at the employment registers of other organizations, in many cases greater by an order of magnitude.

1984 Employment Register in Louisville

The Employment Register at the Louisville meeting will take place in the Commonwealth Convention Center, Exhibit Space A, on Thursday, Friday, and Saturday, January 26, 27, and 28, 1984. A short (optional) orientation session will be conducted by the Committee on Employment Opportunities at 9:00 a.m. on Thursday, January 26. The purpose of the orientation session is to familiarize participants with the operation of the Register and with the various forms involved. Following orientation, participants of the Employment Register can pick up their interview request forms. Computer-scheduled interviews will be held on Friday and Saturday, January 27 and 28. No interviews will be held on Thursday.

Fifteen-minute intervals are allowed for interviews, including two or three minutes between successive interviews. The interviews are scheduled in half-day sessions: Friday morning and afternoon, and Saturday morning and afternoon, amounting to four half-day sessions for interviews. There are ten time periods (9:30–11:45 a.m.) in which interviews can be scheduled in the morning sessions and fourteen time periods (1:15–5:00 p.m.) in the afternoon sessions. It is possible that an applicant or employer may be scheduled for the maximum number of interviews in a session. The scheduling program gives priority to your first six requests. The remaining requests will be accommodated depending on the availability of participants. The scheduling program does not have a provision allowing participants to specify particular times for interviews beyond the choice of session (day, and morning or afternoon). Such requests cannot be accommodated.

Requests for interviews to take place during the two sessions on Friday must be submitted on Thursday between 9:30 a.m. and 4:00 p.m. Requests for interviews to take place during the Saturday sessions must be submitted on Friday before 4:00 p.m.

On Friday and Saturday mornings at 9 a.m. all schedules for applicants and employers for the day (both the morning and afternoon sessions) will be available for distribution in the Commonwealth Convention Center, Exhibit Space A.

The Saturday afternoon session is the annual “employers’ choice” session. For this session interviews will be scheduled on the basis of requests made by employers. Applicants do not submit specific interview requests for this session; but, in order to participate they must indicate their availability for the session by filing the Interview Request Form for Saturday, indicating that they will attend the afternoon session that day. Request Forms for the “employers’ choice” session must be submitted by 4:00 p.m. on Friday in order for the interviews to be scheduled for Saturday afternoon.

Applicants should be aware of the fact that interviews arranged by the Employment Register represent only an initial contact with employers, and that hiring decisions are not ordinarily made during or immediately following such interviews. Applicants are advised to bring a number of copies of their vitae or résumés so that they may leave them with prospective employers.

All participants in the Employment Register are required to register for the Joint Mathematics Meetings. For applicants there is no additional fee for participation in the Employment Register.

The preregistration deadline was December 5, 1983.

For employers, additional fees for participation in the Employment Register were $50, if paid before the December 5 deadline for Joint Meetings preregistration, or $75 if paid at the meeting.

Employers who wish to participate in the Register and who have neither preregistered nor paid the Employment Register fee must go
to the Joint Mathematics Meetings registration desk in the Main Lobby of the Commonwealth Convention Center in order to complete their registration. Registration for the Joint Meetings is required to use the Employment Register facilities. (No provision will be made to handle cash transactions at the site of the Employment Register in the Commonwealth Convention Center, Exhibit Space A.)

Employers and applicants who have completed registration for the Employment Register, and employers and applicants who have preregistered, may pick up their MSER material after 9:30 a.m. on Thursday, January 26, in the Commonwealth Convention Center, Exhibit Space A, where the Employment Register will be held. All who wish to have interviews scheduled for Friday or Saturday, must submit their Interview Request Forms on the preceding day by 4:00 p.m. Those who fail to do so cannot be included in the pool of available participants when the matching program which schedules the interviews is run on the computer that night. This applies both to preregistered employers and applicants, and to those registering at the meeting.

These forms are given to participants at the meeting. These are not the forms that are completed with preregistration.

The MSER registration fee for employers covers the cost of a copy of the December Issue of Employment Information in the Mathematical Sciences (EIMS). This publication contains printed copies of the résumés of applicants who preregistered prior to the December 5 deadline; it also contains a copy of the summary Winter List of Applicants. The résumés themselves will be posted at the site of the Register in addition to the résumés of those who register at the meeting. Additional copies of the December Issue of EIMS and both the summary Winter Lists (of Applicants and of Employers) will be available for sale at the AMS Book Sale at the meeting, as long as supplies last. Prices at the meeting are $2 each for the summary lists and $3 for the December issue. Any copies remaining after the meeting will be available from the Providence office of the Society for $3 and $6, respectively. (Attention is called to the fact that the December issue of EIMS contains the Winter List of Applicants, but does not contain the Winter List of Employers.)

The Winter List of Employers consists of summaries of the position listings submitted by the employers who preregistered for the meeting; it will be distributed without charge to the applicants participating in the Register. Others may purchase the Winter List of Employers at the AMS Book Sale at the meeting or from the Providence office later, as long as the supply lasts. (See previous paragraph for prices.)

The Mathematical Sciences Employment Register is sponsored by the American Mathematical Society, the Mathematical Association of America, and the Society for Industrial and Applied Mathematics; it is operated by members of the AMS staff under the general supervision of the joint AMS-MAA-SIAM Committee on Employment Opportunities.

CONTEMPORARY MATHEMATICS

PROCEEDINGS OF THE CONFERENCE ON INTEGRATION, TOPOLOGY, AND GEOMETRY IN LINEAR SPACES
edited by William H. Graves

This book contains survey articles contributed by speakers at a conference held at the University of North Carolina in Chapel Hill in the spring of 1979 and organized around contributions of the late B. J. Pettis to the development of measure and integration in linear spaces and the role of general linear spaces in measure-theoretic considerations. Topics covered include strict topologies in topological measure theory (by H. Collins), the Dunford-Pettis property (by J. Diestel), the Radon-Nikodym property (by R. Huff), the Orlicz-Pettis phenomenon (by N. Kalton), applications of measure and integration in linear spaces (by I. Kluvanek), and the role of the Pettis measurability theory (by J. J. Uhl, Jr.). In addition to these survey articles which impart both a historical and a state-of-the-art flavor, the book contains several research articles devoted to topics as diverse as spectral theory (by N. Dunford) and weak and strong compactness in spaces of Pettis integrable functions (by J. Brooks and N. Dinculeanu).

The book gives an overview of the current state of affairs in the study of measure and integration in linear spaces and applications thereof. Those who will enjoy these papers are workers in functional analysis with an interest in measure and integration in linear spaces, especially the many delighted readers of Diestel and Uhl's Vector Measures (Amer. Math. Soc. Mathematical Surveys, Volume 15).

Volume 2, 269 pages (soft cover)
List price $18, institutional member $14, individual member $9
ISBN 0-8218-5002-4; LC 80-25417
Publication date: November 1980
To order, please specify COM/2/N

Prepayment is required for all AMS publications. Order from AMS, P. O. Box 1571, Annex Station, Providence, RI 02901, or call toll free 800-556-7774 to charge with Visa or MasterCard.

44
Program of the Sessions

All sessions will be held in the Commonwealth Convention Center.

The time limit for each contributed paper in the AMS general sessions is ten minutes. In the special sessions, the time limit varies from session to session and within sessions. To maintain the schedule, time limits will be strictly enforced.

Abstracts of papers presented in AMS sessions at this meeting will be found in the January 1984 issue of Abstracts of papers presented to the American Mathematical Society, ordered according to the numbers in parentheses following the listings below.

For papers with more than one author, an asterisk follows the name of the author who plans to present the paper at the meeting.

Wednesday, January 25, 1984, 8:00 a.m.

Special Session on Commutative Algebra, I
8:00–8:20 (1) Some properties of divisorial prime ideals in Prüfer domains. MARCO FONTANA, University of Rome, Italy, and JAMES A. HUCKABA* and IRA J. PAPICK, University of Missouri, Columbia (809-13-270)
8:30–8:50 (2) Locally factorial integral domains. D. D. ANDERSON, University of Iowa, and DAVID F. ANDERSON*, University of Tennessee, Knoxville (809-13-03)
9:00–9:20 (3) Finitely generated intermediate rings. ROBERT GILMER*, Florida State University, and WILLIAM HEINZER, Purdue University, West Lafayette (809-13-108)
9:30–9:50 (4) Algebras for which all proper subalgebras are finitely generated. Preliminary report. ROBERT GILMER, Florida State University, and WILLIAM HEINZER*, Purdue University, West Lafayette (809-13-202)
10:00–10:20 (5) Unique factorization rings with zero divisors. D. D. ANDERSON* and RAJ MARKANDA, University of Iowa (809-13-62)
11:00–11:20 (7) Examples of N-rings. Preliminary report. WILLIAM HEINZER, Purdue University, West Lafayette, and DAVID LANTZ*, Colgate University and Purdue University, West Lafayette (809-13-201)

Wednesday, January 25, 1984, 8:00 a.m.

Special Session on Vector Field Systems and Control, I
8:00–8:20 (8) Affine feedback controllability of constant coefficient differential equations. DAHLARD L. LUKES, University of Virginia (809-93-89)
8:30–8:50 (9) Time optimal control in the plane. HECTOR J. SUSSMANN, Rutgers University, New Brunswick (809-93-116)
9:00–9:50 Discussion
10:00–10:20 (10) On feedback linearizability of a nonlinear system on $\mathbb{R}^2$. Preliminary report. WILLIAM M. BOOTHBY, Washington University (809-93-263)
10:30–10:50 (11) Extension of the Frobenius theorem. MICHAEL FREEMAN, University of Kentucky (809-53-391)
11:00–11:20 (12) First order Lagrangian field theory. Preliminary report. ROBERT B. GARDNER*, University of North Carolina, Chapel Hill, and WILLIAM SHADWICK, University of Waterloo (809-49-64)

Wednesday, January 25, 1984, 8:30 a.m.

Session on Ring Theory
8:30–8:40 (14) Periodic rings with commuting nilpotents. HAZAR ABU-KHUZAM, University of Petroleum and Minerals, Saudi Arabia, and ADIL YAQUB*, University of California, Santa Barbara (809-16-22)
8:45–8:55 (15) Some problems about polynomial rings. Preliminary report. BUDD NASHIER, Pennsylvania State University, Mont Alto (809-13-340)
9:00–9:10 (16) Infinite matrix types which determine Morita equivalence. Preliminary report. GENE D. ABRAMS, University of Colorado, Colorado Springs (809-16-56)
9:30–9:40 (18) Separable extensions of non-commutative rings. Elizabeth W. McMahon*, Williams College, and Ancel C. Mewborn, University of North Carolina, Chapel Hill (809-16-82)


10:00–10:10 (20) Construction of primary decompositions of finitely generated ideals in Noetherian rings. Preliminary report. Wim B. Ruitenburg, New Mexico State University, Las Cruces (809-13-118)


10:30–10:40 (22) On the endomorphism ring of a module noetherian with respect to a torsion theory. Jonathan S. Golan, George Mason University (809-16-148)


11:00–11:10 (24) Golde dimension of prime factors of polynomial and skew polynomial rings. Allen D. Bell, University of Washington (809-16-347)

11:15–11:25 (25) Twisted polynomial rings satisfying a polynomial identity. Robert F. Damiano and Jay Shapiro*, George Mason University (809-16-147)

11:30–11:40 (26) The extended centroid in semiprime rings with involution. W. E. Baxter*, University of Delaware, and W. S. Martindale III, University of Massachusetts, Amherst (809-16-424)

11:45–11:55 (27) Herstein’s Lie and Jordan theory revisited. W. S. Martindale III*, University of Massachusetts, Amherst, and C. R. Miers, University of Victoria (809-16-425)

Wednesday, January 25, 1984, 8:30 a.m.

Session on Combinatorics

8:30–8:40 (28) On the combinatorics of Kostant’s partition function. II. Robert W. Deckhart, Miami University, Oxford (809-22-452)

8:45–8:55 (29) Isomorphic cyclic designs which are not equivalent. Neal Brand, North Texas State University (809-05-103)

9:00–9:10 (30) Constructions of Mendelsohn designs. W. Cary Huffman, Loyola University, Chicago (809-05-324)


9:30–9:40 (32) Proof of a conjecture on tournaments. Peter M. Gibson, University of Alabama, Huntsville (809-35-315)


10:15–10:25 (35) Some combinatorial formulas by function(al) equations. Donald R. Snow, Brigham Young University, Provo (809-05-415)


10:45–10:55 (37) Affine and combinatorial binary m-spaces. T. C. Brown, Simon Fraser University (809-05-130)

11:00–11:10 (38) Conjecture on the rank modulo p of the incidence matrix for the Desarguesian finite projective plane of order n = p^2. Zakhary Deretsky, University of California, Davis (809-05-329) (Introduced by Morris Newman)


11:45–11:55 (41) Even order extendible Abelian groups. Tatiana Deretsky, University of California, Davis (809-05-328)

Wednesday, January 25, 1984, 9:00 a.m.

Invited Address


Wednesday, January 25, 1984, 9:00 a.m.

Special Session on Homotopy Theory

9:00–9:20 (43) Universal gauge groups. Preliminary report. Benjamin M. Mann, Bowdoin College (809-55-48)
10:00-10:20
Recent developments in etale K-theory. Preliminary report. William Dwyer, University of Notre Dame, and Eric M. Friedlander*, Northwestern University (809-18-528)

10:30-10:50

Wednesday, January 25, 1984, 9:00 a.m.

Special Session on Function Theoretic Operator Theory, I

9:00- 9:20
Some results of James P. Williams. John B. Conway, Indiana University, Bloomington (809-47-71)

9:30- 9:50
L∞ optimization over spaces of analytic functions. J. William Helton, University of California, San Diego (809-46-214)

10:00-10:20
The minimal normal extension problem for a subnormal operator. James Dудziak, Bucknell University (809-47-158)

10:30-10:50
Algebras generated by an essentially normal operator. Scott W. Brown, University of Hawaii, Honolulu (809-47-271)

11:00-11:20
Toeplitz operators in the Bergman space and bounded point evaluations. Preliminary report. Charles H. Voas, Lehigh University (809-47-381)

11:30-11:50
Ultraweakly closed algebras and invariant subspaces. Preliminary report. C. Apostol, Arizona State University, H. Bercovici*, Massachusetts Institute of Technology, C. Foias, Indiana University, Bloomington, and C. Pearcy, University of Michigan, Ann Arbor (809-47-99)

Wednesday, January 25, 1984, 9:00 a.m.

Special Session on Partial Differential Operators, I

9:00- 9:20
Remarks on the smoothness of limiting resolvents. Allen Devinatz, Northwestern University (809-35-24)

9:30- 9:50
LP-multipliers of Hermite and Laguerre operators. Preliminary report. David Gurarie, Case Western Reserve University (809-35-307)

10:00-10:20
On the intertwining of certain elliptic operators. Gerhard K. Kalisch, University of California, Irvine (809-35-305)

10:30-10:50
Behavior of differential operators under conformal deformation. Thomas P. Branson, Purdue University, West Lafayette (809-35-492)

11:00-11:20
Infinitesimal generators of groups and semigroups. Preliminary report. Harold E. Benzinger, University of Illinois, Urbana-Champaign (809-47-140)

11:30-11:50
Resolvents of elliptic boundary value problems. Mark A. Kon, Boston University (809-35-456)

Wednesday, January 25, 1984, 9:15 a.m.

Session on Convergence and Approximation Theory

9:15- 9:25
Convergence of a certain type of alternating series. Preliminary report. N. V. Rao, University of Toledo (809-40-374)

9:30- 9:40
On a biorthogonal system of functions. Preliminary report. N. M. Temme, Mathematisch Centrum, Amsterdam, and K. Soni*, University of Tennessee, Knoxville (809-41-493)

9:45- 9:55
Bernstein inequalities for incomplete polynomials. Preliminary report. B. S. Elenbogen and M. A. Lachance*, University of Michigan, Dearborn (809-41-494)

10:00-10:10

10:15-10:25
On the degree of weak convergence of a sequence of finite measures (μn)nexN to the unit measure δω (Part 1). Preliminary report. George A. Anastassiou, University of Rochester (809-41-186)

10:30-10:40
A nonconvex set. Preliminary report. Gordon G. Johnson, Emory University, Atlanta, and University of Houston (809-52-387)

10:45-10:55
Little Norlund means in the Banach algebra Δ. Preliminary report. James DeFranza* and Daniel Fleming, St. Lawrence University (809-40-373)

11:00-11:10
Continued fraction convergence sets which are bounded by simple closed curves. Preliminary report. F. A. Roach, University of Texas, San Antonio (809-40-460)

11:15-11:25
On two conjectures concerning the partial sums of the harmonic series. Stephen M. Zemyan, Pennsylvania State University, Mont Alto (809-40-459)

11:30-11:40
Matrix summability of geometrically dominated series. Preliminary report. G. H. Fricke*, Wright State University, Dayton, and J. A. Fridy, Kent State University, Kent (809-40-515)
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:45-11:55</td>
<td>(69) Inclusion among some paranormed sequence spaces. R. N. Mohapatra, York University (809-40-543)</td>
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**Wednesday, January 25, 1984, 9:30 a.m.**

**Session on Geometry and Topology**

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<th>Time</th>
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<tr>
<td>9:30-9:40</td>
<td>(70) Special classes of closure-preserving families. Preliminary report. Henry B. Potoczny, United States Air Force Institute of Technology (809-54-556)</td>
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<tr>
<td>9:45-9:55</td>
<td>(71) A linearizable metric space. Preliminary report. Grattan Murphy, University of Maine, Orono (809-51-497)</td>
</tr>
<tr>
<td>10:00-10:10</td>
<td>(72) Analogue clocks. Sandra L. Arlinghaus, University of Michigan, Ann Arbor (809-51-468)</td>
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<tr>
<td>10:15-10:25</td>
<td>(73) The limacons of Pascal as orthogonal trajectories and as loci. Rodney T. Hood, Franklin College (809-50-467)</td>
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<tr>
<td>10:30-10:40</td>
<td>(74) On local lie-admissible algebras. Preliminary report. Anton Schober, Pennsylvania State University, Erie (809-51-386)</td>
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<tr>
<td>10:45-10:55</td>
<td>(75) On the projectivity of B-ovals. William E. Cherowitzo, University of Colorado, Denver (809-51-289)</td>
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<td>11:00-11:10</td>
<td>(76) Sylow-like theorems for equidistance spaces. Thomas Q. Sibley, Beloit College (809-51-248)</td>
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<tr>
<td>11:15-11:25</td>
<td>(77) A class of semifields of order q^4. Victoria L. Boerner, Mankato State University (809-51-249)</td>
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<td>11:30-11:40</td>
<td>(78) Local motions. Preliminary report. Raymond B. Killgrove, University of South Carolina, Aiken (809-51-175)</td>
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**Wednesday, January 25, 1984, 9:45 a.m.**

**Session on Operator Theory (Abstract)**

<table>
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<th>Time</th>
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<tr>
<td>9:45-9:55</td>
<td>(80) Order continuous Borel liftings. David C. Carothers, Hope College (809-47-81)</td>
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<tr>
<td>10:00-10:10</td>
<td>(81) Limits of operator approximants. David Legg*, Indiana University-Purdue University, Fort Wayne, and Joseph Ward, Texas A&amp;M University, College Station (809-47-112)</td>
</tr>
<tr>
<td>10:15-10:25</td>
<td>(82) Tridiagonal matrices and absolute continuity. Joanne M. Dombrowski, Wright State University, Dayton (809-47-191)</td>
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<tr>
<td>10:30-10:40</td>
<td>(83) Set-valued mappings of accretive type in Banach spaces. Claudio Morales, University of Alabama, Huntsville (809-47-496)</td>
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<td>10:45-10:55</td>
<td>(84) Reductive operators. Howard B. Mendelson, Litton Systems, College Park, Maryland (809-47-465)</td>
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<tr>
<td>11:00-11:10</td>
<td>(85) Duality and asymptotic spectral decomposition. Ridgley Lange, Central Michigan University (809-47-295)</td>
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<tr>
<td>11:15-11:25</td>
<td>(86) Holomorphic semigroups on a locally convex space. Preliminary report. Young Han Choe, Kansas State University (809-47-383)</td>
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<td>11:30-11:40</td>
<td>(87) Generalized Cesaro matrices. Crawford Raly, Millsaps College (809-47-432)</td>
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**Wednesday, January 25, 1984, 9:45 a.m.**

**Session on Ordered Algebraic Structures**

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<th>Time</th>
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<tr>
<td>9:45-9:55</td>
<td>(89) Commutator-finite orthomodular lattices. Richard Greechie* and Louis Herman, Kansas State University (809-06-287)</td>
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<tr>
<td>10:00-10:10</td>
<td>(90) The tensor product of distributive lattices which satisfy the descending chain condition. Andrew M. Bell, University of Illinois, Urbana-Champaign, Michael R. Brown, California State University, Hayward, and Grant A. Fraser*, California State University, Los Angeles (809-06-330)</td>
</tr>
<tr>
<td>10:30-10:40</td>
<td>(92) The idempotent order in Boolean-like rings. J. C. Abbott, S. Butcher, R. Lee and K. Zak*, United States Naval Academy (809-06-483)</td>
</tr>
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<td>10:45-10:55</td>
<td>(93) Periodic elements of a totally ordered, regular semigroup. C. C. Edwards* and W. G. Fredrick, Indiana-Purdue University, Fort Wayne (809-06-511)</td>
</tr>
<tr>
<td>11:00-11:10</td>
<td>(94) Principal congruences of pseudocomplemented deMorgan algebras. Hanamantagouda P. Sankappanavar, State University of New York, New Paltz (809-06-336)</td>
</tr>
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11:15-11:25 (95) States on the generalizations of the Greechie lattice. Preliminary report. GERALD SCHRAG, Central Missouri State University (809-06-60)

11:30-11:40 (96) Epimorphisms in discriminator varieties. STEPHEN D. COMER, The Citadel (809-08-32)

11:45-11:55 (97) Independence and similarity type. Preliminary report. WILLIAM A. LAMPE*, University of Hawaii, Honolulu, and JIRI SCHLIER, University of Manitoba (809-08-416)

Wednesday, January 25, 1984, 10:00 a.m.

Special Session on Ill-Posed Problems, I


10:30-10:50 (99) Undetermined coefficients in elliptic and parabolic operators. Preliminary report. WILLIAM RUNDÆL, Texas A&M University, College Station (809-35-297)

11:00-11:20 (100) Linearization stability for an inverse problem in several-dimensional wave propagation. WILLIAM W. SYMES, Michigan State University (809-35-533) (Introduced by William L. Perry)

11:30-11:50 (101) Estimates and regularization for solutions of some ill posed problems. HOWARD A. LEVINE*, Iowa State University, and SERGIO VESSELLA, Istituto Analisi Globali e Applicazioni (C.N.R.), Italy (809-35-273)

Wednesday, January 25, 1984, 10:15 a.m.

Invited Address

10:15-11:15 (102) Design and analysis of self-adjusting data structures. ROBERT E. TARJAN, Bell Laboratories, Murray Hill (809-68-320)

Wednesday, January 25, 1984, 10:45 a.m.

Session on Fields, Rings and Modules

10:45-10:55 (103) Intersections of algebraically closed fields. JOHN W. ROSENTHAL, Ithaca College (809-12-292)

11:00-11:10 (104) Negligibility of linear factors of automorphisms. MOAFFAQ HAJJA, Yarmouk University, Jordan (809-12-224)

11:15-11:25 (105) The structure of a group of permutations over a finite field. GARY L. MULLEN*, Pennsylvania State University, University Park, and HARALD NIEDERREITER, Austrian Academy of Sciences (809-12-339)

11:30-11:40 (106) Modules whose distinct submodules are not isomorphic. WILLIAM D. WEAKLY, Northern Illinois University (809-13-486)

11:45-11:55 (107) Noetherian integrally closed ideals in a domain. NICK H. VAUGHAN, North Texas State University (809-13-487)

Wednesday, January 25, 1984, 1:00 p.m.

Colloquium Lectures: Lecture I

1:00- 2:00 (108) On the arithmetic of curves. I. BARRY MAZUR, Harvard University

Wednesday, January 25, 1984, 1:15 p.m.

Session on Functional Analysis

1:15– 1:25 (109) Local reflexivity of normed spaces, operators and Fréchet spaces. STEVEN F. BELLENOT, Florida State University (809-46-172)

1:30– 1:40 (110) Weighted composition operators on Banach lattices. WILLIAM A. FELDMAN*, University of Arkansas, Fayetteville, and JAMES F. PORTER, University of Mississippi (809-46-378)

1:45– 1:55 (111) Differentiability of convex functions and Rybakov's theorem. RUSSELL G. BILYEU and PAUL W. LEWIS*, North Texas State University (809-46-253)

2:00– 2:10 (112) Dunford-Pettis operators and weak Radon-Nikodým sets. LAWRENCE H. RIDDLE, Emory University, Atlanta (809-46-13)

2:15– 2:25 (113) Characterizations of Tauberian operators and norm-attainment of linear functionals on subspaces. RICHARD NEIDINGER* and HASKELL P. ROSENTHAL, University of Texas, Austin (809-46-63)


3:00–3:10 (116) On Hankel transformable spaces and a Cauchy problem. Preliminary report. Ram S. Pathak, King Saud University, Saudi Arabia (809-46-222) (Introduced by S. A. Warsi)

3:15–3:25 (117) Random normal structures. Troy L. Hicks, University of Missouri, Rolla (809-46-242)

3:30–3:40 (118) Coincidence degree and bifurcation relative to convex sets. Robert E. Gaines, Colorado State University, and Jairo Santanilla*, University of Iowa (809-46-464)


4:00–4:10 (120) Periodic solutions of Volterra equations. Preliminary report. T. A. Burton, Southern Illinois University, Carbondale (809-45-65)


4:30–4:40 (122) Atoms of measures for which a perturbation of the Chebyshev polynomials are orthogonal. Preliminary report. Attila Máté*, Brooklyn College, City University of New York, and Paul Nevai and Vilmos Totik, Ohio State University, Columbus (809-42-254)

4:45–4:55 (123) The Hilbert transform for convex curves in $\mathbb{R}^n$. Alexander Nagel and Stephen Wainger, University of Wisconsin, Madison, James Vance*, Wright State University, Dayton, and David Weinberg, Texas Tech University (809-42-275)

5:00–5:10 (124) Integrability of complex trigonometric series. William O. Bray*, University of Maine, Orono, and Vera B. Stanojević, University of Missouri, Rolla (809-42-375)

Wednesday, January 25, 1984, 1:15 p.m.

Session on Operator Theory (Hard-Core)

1:15–1:25 (125) Quasisimilarity and closures of similarity orbits. Preliminary report. L. A. Fialkow, State University of New York, New Paltz (809-47-495)

1:30–1:40 (126) Hankel operators and uniform algebras. Raúl E. Curto*, Paul S. Muhly, and Jingbo Xia, University of Iowa, and Takahiko Nakazi, Hokkaido University, Japan (809-47-288)

1:45–1:55 (127) Closure of graphs of differential operators and subjordan operators. Thomas R. Fanney, Virginia Polytechnic Institute and State University (809-47-516)

2:00–2:10 (128) A characterization of the positive part of a pure hyponormal operator. Preliminary report. Peng Fan, Texas Christian University (809-47-117)

2:15–2:25 (129) On zero-trace commutators. Preliminary report. Fuad Kittaneh, United Arab Emirates University (809-47-08)

2:30–2:40 (130) Cowen-Douglas operators are hyper-reflexive. Karim Seddighi, University of Calgary (809-47-113)


3:00–3:10 (132) Nonreductive normal operators arising as analytic functions of unitary operators. Preliminary report. T. Len Miller, Mississippi State University (809-47-252)

3:15–3:25 (133) A characterization of strongly decomposable operators on a reflexive Banach space. Jon C. Snader, University of South Florida, Tampa (809-47-430)


Wednesday, January 25, 1984, 1:15 p.m.

Session on Classes of Complex-Valued Functions

1:15–1:25 (135) Convex functions of bounded type. A. W. Goodman, University of South Florida, Tampa (809-30-11)


1:45–1:55 (137) Into isometries of the disc algebra A. Preliminary report. John E. Wolfe* and Mohamed A. El-Gebaly, Oklahoma State University, Stillwater (809-30-38)

2:00–2:10 (138) Univalent functions having univalent derivatives. Preliminary report. Herb Silverman, College of Charleston (809-30-124)


2:45– 2:55 (141) Functions of bounded index in several variables. MOHAMMAD SALMASSI, University of Hartford (809-30-426) (Introduced by M. S. Shah)

3:00– 3:10 (142) On a characterization of the class of starlike univalent functions. Preliminary report. H. S. AL-AMIRI, Bowling Green State University (809-30-489)

3:15– 3:25 (143) Best harmonic \( L^1 \) approximation to subharmonic functions. MYRON GOLDSTEIN*, Arizona State University, and WERNER HAUSMANN and KURT JETTER, University of Duisburg, Federal Republic of Germany (809-31-12)

3:30– 3:40 (144) Chains on strictly pseudo-convex boundaries in \( C^2 \). Preliminary report. HOWARD JACOBOWITZ, Institute for Advanced Study (809-32-356)

3:45– 3:55 (145) Removable singularities for \( n \)-harmonic functions and Hardy classes in polydiscs. Preliminary report. DAVID SINGMAN, Pennsylvania State University, Mont Alto (809-32-388)

4:00– 4:10 (146) Bergman projections of compactly supported functions on circular domains. PAUL M. ZORN, St. Olaf College (809-32-357)

4:15– 4:25 (147) Extreme elements of the class of normalized holomorphic functions on the bi-disk with positive real part. JOHN N. MCDONALD, Arizona State University (809-32-240)

4:30– 4:40 (148) Completely monotonic functions of the form \( S^{-b}(s^2 + 1)^{-a} \). Preliminary report. DANIEL S. MOAK, Michigan Technological University (809-33-276)

4:45– 4:55 (149) Expansions for Bessel functions in \( P_n \). Preliminary report. THOMAS BENGTSON, Miami University, Oxford (809-33-245)

5:00– 5:10 (150) Mathematical analysis of a renal countercurrent system. Preliminary report. J. B. GARNER, Louisiana Tech University (809-34-241)

Wednesday, January 25, 1984, 2:05 p.m.

Special Session on Vector Field Systems and Control, II

2:05– 2:25 (151) Algebraic criteria for accessibility of polynomial systems. VELIMIR JURDJEVIC, University of Toronto, Canada (809-93-521)

2:35– 2:55 (152) Some properties of distributions which contain asymptotically stable vector fields. ROGER W. BROCKETT, Harvard University (809-93-542)

3:05– 3:25 (153) The realizaton of symmetric systems over the circle. ROBERT GROSSMAN*, Princeton University, and CLYDE MARTIN, Texas Tech University (809-93-212)

3:35– 4:35 Discussion

4:45– 5:05 (154) On the Taylor approximation of control systems. ALBERTO BRESSAN, University of Wisconsin, Madison (809-93-26) (Introduced by Henry Hermes)

5:15– 5:35 (155) Equivalence of nonlinear systems. ARTHUR J. KRENER, University of California, Davis (809-93-412)

Wednesday, January 25, 1984, 2:15 p.m.

Invited Address

2:15– 3:15 (156) Segal's Burnsise ring conjecture. GUNNAR CARLSSON, University of California, San Diego (809-55-480)

Wednesday, January 25, 1984, 2:15 p.m.

Special Session on Function Theoretic Operator Theory, II

2:15– 2:35 (157) A simple proof of Putnam's theorem for subnormal operators. SHELDON AXLER* and JOEL H. SHAPIRO, Michigan State University (809-47-272)

2:45– 3:05 (158) A characterization of \( P^2(\mu) \neq L^2(\mu) \). Preliminary report. TAVAN T. TRENT, University of Alabama, Tuscaloosa (809-47-107)

3:15– 3:35 (159) Algebra homomorphisms of \( H^\infty \) into \( L^\infty \). Preliminary report. BOB OLIN and JIM THOMSON*, Virginia Polytechnic Institute and State University (809-46-23)

3:45– 4:05 (160) Dilation on an annulus. Preliminary report. JIM AGLER, California Institute of Technology (809-37-400) (Introduced by John B. Conway)

4:15– 4:35 (161) Nevanilma-Pick kernels and the functional models for contraction operators. JOSEPH A. BALL, Virginia Polytechnic Institute and State University, and THOMAS L. KRIETE, III*, University of Virginia (809-47-380)

4:45– 5:05 (162) An irreducible subnormal operator with infinite multiplicities. Preliminary report. J. B. CONWAY, Indiana University, Bloomington, and C. R. PUTNAM*, Purdue University, West Lafayette (809-47-72)

5:15– 5:35 (163) A survey of Hilbert space operators with rank one self-commutators. KEVIN F. CLANCHEY, University of Georgia (809-47-15)
5:45–6:05 (164) Composition operators induced by linear fractional transformations. Preliminary report. CARL C. COWEN, Purdue University, West Lafayette (809-47-213)

Wednesday, January 25, 1984, 2:15 p.m.

Special Session on Partial Differential Operators, II
2:15–2:35 (165) Essential self-adjointness criteria for higher order partial differential operators. ROBERT M. KAUFFMAN, University of Alabama, Birmingham (809-35-369)
2:45–3:05 (166) The extension problem for accretive differential operators. IAN KNOWLES, University of Alabama, Birmingham (809-35-198)
3:45–4:05 (168) Parameter dependence of a 2 x 2 semilinear parabolic system in two space dimensions. Preliminary report. CLYDE E. COLLINS, Louisiana State University, Baton Rouge (809-35-74)

Wednesday, January 25, 1984, 2:15 p.m.

Special Session on Ill-Posed Problems, II
3:45–4:05 (174) Inverse scattering in one dimension: forward analyticity and the miracle. ROGER G. NEWTON, Indiana University, Bloomington (809-81-69) (Introduced by William L. Perry)
4:15–4:35 (175) Determining piecewise analytic conductivities by boundary measurements. Preliminary report. R. KOHN, Courant Institute of Mathematical Sciences, New York University, and M. VOGELIUS*, University of Maryland, College Park (809-80-96)

Wednesday, January 25, 1984, 2:15 p.m.

Special Session on Ring Theory, I
2:15–2:35 (176) Semiprime crossed products and group-graded rings. D. S. PASSMAN* and D. QUINN, University of Wisconsin, Madison (809-16-169)
2:45–3:05 (177) On automorphisms of Weyl algebra. LEONID MAKAR-LIMANOV, Wayne State University (809-16-17)
3:45–4:05 (179) Affine domains of finite Gel'fand-Kirillov dimension which are right, but not left, noetherian. RICHARD RESCO, University of Oklahoma (809-16-209)
4:15–4:35 (180) Group actions on categories. ROBERT GORDON, Temple University, Philadelphia (809-16-549)
4:45–5:05 (181) Hopf algebra actions. Preliminary report. MIRIAM COHEN* and DAVIDA FISHMAN, Ben Gurion University, Israel (809-16-304)
5:15–5:35 (182) The Schur group of a commutative ring. FRANK DEMEYER*, Colorado State University, and RICHARD MOLLIN, University of Calgary (809-16-84)
5:45–6:05 (183) Prime ideals in intermediate normalizing extensions. A. G. HEINICKE, University of Western Ontario (809-16-120)

Wednesday, January 25, 1984, 2:15 p.m.

Special Session on Commutative Algebra, II
2:15–2:35 (184) Sequences of linear type. DOUGLAS COSTA, University of Virginia (809-13-195)
2:45–3:05 (185) F-injectivity and rational singularity. RICHARD FEDDER, University of Missouri, Columbia (809-13-200) (Introduced by Ira Papick)

54
3:45 - 4:05 (187) Finiteness conditions on coherent domains.  
Sarah Glaz*, Wesleyan University, and Wolmer V. Vasconcelos, Rutgers University, New Brunswick (809-13-236)

4:15 - 4:35 (188) Cancellation and prime spectra.  
Preliminary report.  Jon L. Johnson, Elmhurst College (809-13-78)

4:45 - 5:05 (189) Pole assignability in Bézout domains.  
James Brewer, University of Kansas (809-13-61)

Wednesday, January 25, 1984, 2:30 p.m.

Session on Generalised Integration Theory
2:30 - 2:40 (190) Necessary and sufficient conditions for the Fresnel integrability of certain classes of functions.  
Kun Chang, Yonsei University, Korea, Gerald Johnson and David Skoug*, University of Nebraska, Lincoln (809-28-226)


3:00 - 3:10 (192) Stochastic partitions of sub $\sigma$-fields of a probability measure space. Olga R. Beaver, Williams College (809-28-353)


Wednesday, January 25, 1984, 2:30 p.m.

Session on Surfaces and Curves
Mei-Chu Chang*, California Institute of Technology, and Ziv Ran, University of Chicago (809-14-344) (Introduced by Mark Crawshaw)

2:45 - 2:55 (195) Enumerating stationary multiple-points. Susan Jane Colley, Oberlin College (809-14-319)

3:00 - 3:10 (196) Zariski surfaces. Piotr Blass, University of Arkansas, Fayetteville (809-14-537)


Wednesday, January 25, 1984, 2:30 p.m.

Session on History, Pedagogy and Topics in Undergraduate Mathematics


3:00 - 3:10 (201) Evaluations by students in mathematics courses of the effectiveness of teaching. Preliminary report. James E. Prather, Fred A. Massey*, James E. Greene and Joseph E. Sturgeson, Georgia State University (809-98-522)


3:30 - 3:40 (203) How can we help graduate students develop teaching competency? B. A. Case, Florida State University (809-98-277)


Wednesday, January 25, 1984, 2:30 p.m.

Session on Algebraic Structures

2:45 - 2:55 (206) A class of non-Moufang Bol loops isomorphic to all their loop isotopes. V. S. Ramamurthi* and B. L. Sharma, University of Ile, Nigeria (809-20-160)

3:00 - 3:10 (207) Regular involution groupoids. Preliminary report. V. S. Krishnan, Temple University, Philadelphia (809-20-233)

3:15 - 3:25 (208)Globals of completely regular semigroups. Matthew Gould and Constantine Tsinkelis, Vanderbilt University, and Joseph Iskra*, Wesleyan College (809-20-34)

3:30 - 3:40 (209) On the representation groups of certain special linear groups. F. Rudolf Beyl, Portland State University (809-20-229)

3:45 - 3:55 (210) Characters vanishing on all but two conjugacy classes. Stephen M. Gagola, Jr., Kent State University, Kent (809-20-279)
4:00—4:10 (211) On a conjugate class of subgroups determined by a formation. Preliminary report. MARK HOPFANN, Saint Lawrence University (809-20-310)


4:30—4:40 (213) Nilpotent by supersolvable M-groups. ALAN E. PARKS, Michigan State University (809-20-194)

4:45—5:05 (214) The embedding of two countable groups as regular subgroups of a permutation group. Preliminary report. KENNETH W. JOHNSON, University of the West Indies, Jamaica (809-20-153)

5:00—5:10 (215) $P$-groups with non-abelian automorphism groups and all automorphisms central. J. J. MALONE, Worcester Polytechnic Institute (809-29-149)

5:15—5:25 (216) Direct products of $R_{HY}$-groups. CHARLES S. HOLMES, Miami University, Oxford (809-20-527)

5:30—5:40 (217) More on the $(F_2)$-p-groups. Preliminary report. IAN D. MACDONALD*, Reed College, and E. F. ROBERTSON, University of St. Andrews, Scotland (809-20-512)

Wednesday, January 25, 1984, 2:45 p.m.

Special Session on Incompressible Fluid Flow, I

2:45—3:05 (218) Rigorous connections between the mathematical theory of the Navier-Stokes equations and the conventional theory of turbulence. Preliminary report. P. CONSTANTIN*, Courant Institute of Mathematical Sciences, New York University, C. FOIAS, Indiana University, Bloomington, and R. TEMAM, Université de Paris-Sud, France (809-35-368)

3:15—3:35 (219) A layering method for viscous, incompressible $L_{p}$ flows occupying $R^n$. AVRON DOUGLIS*, University of Maryland, College Park, and EUGENE B. FABES, University of Minnesota, Minneapolis (809-35-370)

3:45—4:05 (220) Approximation of the nonstationary Navier-Stokes equations: stability of solutions and global error analysis. JOHN G. HEYWOOD*, University of British Columbia, and ROLF RANNACHER, Universität Saarbrücken, Federal Republic of Germany (809-35-554)

4:15—4:35 (221) Corotating steady vortex flows with N-fold symmetry. BRUCE TURKINGTON, Northwestern University (809-76-298)


5:15—5:35 (223) Incompressible fluid flow in packed beds. KENNETH L. BOWERS*, Montana State University, and JAMES W. THOMAS, Colorado State University (809-76-80)

Wednesday, January 25, 1984, 3:30 p.m.

Invited Address

3:30—4:30 (224) Some recent results in the theory of minimal surfaces. LEON SIMON, Australian National University, Canberra (809-53-217)

Wednesday, January 25, 1984, 4:45 p.m.

Mathematics and Government Speaker

4:45—5:45 (225) Maximizing the impact of mathematics. EDWARD E. DAVID, JR., EXXON CORPORATION

Wednesday, January 25, 1984, 8:30 p.m.

Josiah Willard Gibbs Lecture

8:30—9:30 (226) Computer programs that model the process of scientific and mathematical discovery. HERBERT A. SIMON, Carnegie-Mellon University

Thursday, January 26, 1984, 8:30 a.m.

Special Session on Commutative Algebra, III

8:30—8:50 (227) Gorenstein ideals of deviation two. CRAIG HUNEKE, Purdue University, West Lafayette, and BERND ULRICH*, Northwestern University (809-13-341)


10:00—10:20 (230) Ideals and modules of linear type. Preliminary report. CRAIG HUNEKE, Purdue University, West Lafayette (809-13-529)

10:30—10:50 (231) The status of some local and global questions in commutative algebra. Preliminary report. MELVIN HOCHSTER, University of Michigan, Ann Arbor (809-13-488)
11:00–11:20 (232) Local minima in the sequence of Betti numbers. Preliminary report. ANDREW R. KUSTIN, University of South Carolina, Columbia (809-13-55)

11:30–11:50 (233) The homotopy fibre of a homomorphism of local rings. Preliminary report. LUCEZAR AVRAMOV, University of Illinois, Urbana-Champaign (809-13-343) (Introduced by Ira Papick)

Thursday, January 26, 1984, 8:30 a.m.

Special Session on Semigroup Theory, I

8:30– 8:50 (234) Residual finiteness and free products of monoids. PETER R. JONES, Marquette University (809-20-268)

9:00– 9:20 (235) On the Bruck-Reilly construction. KARL BYLEEN, Marquette University (809-20-302)

9:30– 9:50 (236) Natural *-representations of inverse semigroups by operators. MICHAEL P. DRAZIN, Purdue University, West Lafayette (809-20-204)

10:00–10:20 (237) Varieties of completely regular semigroups. NORMAN R. REILLY, Simon Fraser University (809-20-97)

10:30–10:50 (238) Semilattices and idempotent semigroups on trees. HASKELL COHEN, University of Massachusetts, Amherst (809-20-350)

11:00–11:20 (239) Semigroups for which the continuum congruences form finite chains. Preliminary report. K. D. MAGILL, JR., State University of New York, Buffalo (809-20-43)


Thursday, January 26, 1984, 8:30 a.m.

Session on Differential Equations and Boundary Values, I

8:30– 8:40 (241) Random walk simulation of solutions to nonlinear differential equations. VADIM KOMKOV, Winthrop College (809-35-40)

8:45– 8:55 (242) A modern version of Kneser's theorem. MICHAEL E. BALLOTI, Western Washington University (809-35-427)

9:00– 9:10 (243) The number of peaks of nonnegative solutions of semilinear parabolic equations. WEI-MING NI, University of Minnesota, Minneapolis, and PAUL SACKS*, Iowa State University (809-35-363)

9:15– 9:25 (244) The essential self-adjointness of powers of Schrödinger operators. THOMAS T. READ, Western Washington University (809-35-294)

9:30– 9:40 (245) Transmutations and non-homogeneous differential equations that involve iterated operators. Preliminary report. LOUIE R. BRAGG, Oakland University (809-35-77)


11:00–11:10 (251) Existence of coupled quasi solutions of systems of nonlinear boundary value problems. Preliminary report. G. S. LADDE* and V. LAKSHMIKANTHAM, University of Texas, Arlington, and A. S. VATSALA, Bishop College (809-35-365)


11:30–11:40 (253) Non-negative heat functions. H. S. BEAR, University of Hawaii, Honolulu (809-35-278)

Thursday, January 26, 1984, 8:30 a.m.

Session on Logic and Foundations
8:30—8:40 (255) Some theorems involving the lattice of recursively enumerable equivalence relations. Preliminary report. JEFFREY S. CARROLL, University of Wisconsin, Madison (809-03-322)
8:45—8:55 (256) Integrating, classical and intuitionistic type theory. ROBERT C. FLAGG, State University of New York, Buffalo (809-03-323)
9:00—9:10 (257) Replacement and collection in intuitionistic set theory. NICOLAS D. GOODMAN, State University of New York, Buffalo (809-03-115)
9:15—9:25 (258) Some new results on arrow and affable ultrafilters. Preliminary report. NED I. ROSEN, Boston College (809-04-413)
9:30—9:40 (259) A (negative) solution of Hilbert’s second problem. GERHARD F. KOHLMAYR, Mathmodel Consulting Bureau (809-03-441)

Thursday, January 26, 1984, 8:30 a.m.

Session on Differential Equations
8:30—8:40 (260) Families of boundary conditions for nonlinear ordinary differential equations. PAUL W. ELOB*, University of Dayton, and JOHNNY HENDERSON, University of Missouri, Rolla (809-34-187)
8:45—8:55 (261) Comparison results for functional differential equations with two middle terms. WITOLD A. KOSMALA, University of Tampa (809-34-39)
9:30—9:40 (264) Almost periodicity by comparison method. Preliminary report. C. CORSUNEANU, University of Texas, Arlington (809-34-450)
9:45—9:55 (265) On the order of an entire solution of an algebraic differential equation. SHLOMO STREILITZ, Haifa University, Israel, and SHOSHANA ABRAMOVICH*, Naval Postgraduate School (809-34-448)
10:00—10:10 (266) Advanced differential equations with piecewise constant argument deviations. S. M. SHAH, University of Kentucky, and JOSEPH WIENER*, Pan American University (809-34-358)
10:30—10:40 (268) Hopf bifurcation and stability for time periodic differential equations. S. R. BERNFELD*, University of Texas, Arlington, and LUIGI SALVADORI, Università di Trento, Italy (809-34-360)
11:00—11:10 (270) Vector-valued entire functions satisfying a differential equation. RANJAN ROY, Beloit College, and S. M. SHAH*, University of Kentucky (809-34-318)
11:30—11:40 (272) Asymptotic behavior of solutions of a certain nth order differential equation in the vicinity of an irregular singular point. T. K. PUTTASWAMY, Ball State University (809-34-246)

Thursday, January 26, 1984, 8:30 a.m.

Session on Stochastic Processes
8:30—8:40 (274) A martingale analysis of numerical integration. Preliminary report. DONALD P. STORY, University of Akron (809-60-314)
8:45—8:55 (275) On a.s. convergence of classes of multivalued asymptotic martingales. SITADRI N. BAGCHI, Ohio State University, Columbus (809-60-500)
9:00—9:10 (276) Lattice martingales. II. Preliminary report. BARRY W. BRUNSON, Western Kentucky University (809-60-519)
9:15—9:25 (277) Volterra equations driven by semimartingales. Preliminary report. PHILIP PROTTER, Purdue University, West Lafayette, (809-60-401)
9:30—9:40 (278) Limit theorems for weighted sums of exchangeable random elements in a Banach space. PETER Z. DAFVER, Vanderbilt University (809-60-400)
9:45—9:55 (279) First exit times from moving boundaries for stochastic sequences. Preliminary report. JAMES C. CRABTREE, University of Illinois, Urbana-Champaign (809-60-475)
10:00–10:10 (280) *Pair-wise independent stationary stochastic processes.* James B. Robertson* and James Womack, University of California, Santa Barbara (809-60-31)


11:30–11:40 (286) Almost sure stability of partial sums of uniformly bounded random variables. Theodore P. Hill, Georgia Institute of Technology (809-60-551)


12:00–12:10 (288) Almost sure convergence of isoperimetric quotient of a random rectangular parallelepiped in $\mathbb{R}^N$ as $N$ goes to infinity. Preliminary report. Thomas M. Zachariah, Claremont Graduate School and Pitzer College (809-60-399) (Introduced by Robert Williamson)

12:15–12:30 (289) Boundaries with negative jumps for the Brownian motion. Chull Park, Miami University, Oxford (809-60-398)

**Thursday, January 26, 1984, 8:45 a.m.**

**Session on Applied Analysis**


9:00–9:10 (291) Stochastic models for common failures of components. Bernard Harris, University of Wisconsin, Madison (809-62-520)


9:30–9:40 (293) Convergent series solution of nonlinear equations. G. Adomian, University of Georgia (809-35-553)


10:30–10:40 (297) Free convection heat transfer at a heated semi-infinite vertical plate. K. Vajravelu, East Carolina University (809-80-408)

**Thursday, January 26, 1984, 9:00 a.m.**

**Invited Address**

9:00–10:00 (298) Vorticity and fluid dynamics. Andrew Majda, University of California, Berkeley

**Thursday, January 26, 1984, 9:00 a.m.**

**Special Session on Ring Theory, II**

9:00–9:20 (299) A nil-nilpotent type of theorem. I. N. Herstein, University of Chicago (809-16-208)

9:30–9:50 (300) The central and normal closure of coproducts of rings over a division ring. Preliminary report. W. S. Martindale III, University of Massachusetts, Amherst (809-16-423)

10:00–10:20 (301) Wreath products and PI algebras. Amitai Regev, Pennsylvania State University, University Park (809-99-555)


11:00–11:20 (303) Noncommutative UFD's are often PID's. M. P. Gilchrist, University of Leeds, England, and M. K. Smith*, University of Texas, Austin (809-16-155)

Thursday, January 26, 1984, 9:00 a.m.

Special Session on Random Walks on Finite Groups
9:00-  9:20  (306) Introduction to random walks on finite groups. Persi Diaconis, Stanford University (809-20-50)
9:30-  9:50  (307) Random shuffles and group representations. Leopold Flatto* and Andrew M. Odlyzko, Bell Laboratories, Murray Hill, and D. B. Wales, California Institute of Technology (809-60-86)
10:00-10:20  (308) Analysis of a class of re-randomized random number generators. Fan R. K. Chung* and R. L. Graham, Bell Laboratories, Murray Hill, and Persi Diaconis, Stanford University (809-05-98)
10:30-10:50  (309) Factoring probabilities on compact groups. M. Shahshahani, Boeing Aerospace, Seattle, Washington (809-22-58)
11:30-11:50  (311) Probability methods for random walks on finite groups. David Aldous, University of California, Berkeley (809-60-47)

Thursday, January 26, 1984, 9:00 a.m.

Special Session on Ordered Algebraic Structures, I
9:00-  9:20  (312) Valuations on ordered rings. Preliminary report. John Dauns, Tulane University (809-06-109)
9:30-  9:50  (313) On the unitarity of a class of partially ordered rings that have squares positive. Stuart Steinberg, University of Toledo (809-06-87)
10:00-10:20  (314) Ordered products of topological groups. Melvin Henriksen*, Harvey Mudd College, Ralph Kopfferman, City College, City University of New York, and Frank Smith, Kent State University, Kent (809-06-335)
10:30-10:50  (315) Functorial hulls of lattice-ordered groups. Anthony W. Hager, Wesleyan University (809-06-256)
11:00-11:20  (316) Convexity conditions and intersections of primary ideals in \( f \)-rings. Preliminary report. Suzanne Larson, Marquette University (809-06-303)
11:30-11:50  (317) On \( f \)-modules over commutative \( f \)-rings. Preliminary report. James J. Madden, University of Kansas (809-06-331)

Thursday, January 26, 1984, 9:00 a.m.

Special Session on Partial Differential Operators, III
9:00-  9:20  (318) Schrödinger operators of the Bernoulli type. Preliminary report. René Carmona, University of California, Irvine (809-47-541)
9:30-  9:50  (319) Resolvent estimates for the Laplacian outside a resonator. Richard Lavine, University of Rochester (809-35-274)
10:00-10:20  (320) The RAGE theorem for contraction semigroups. Preliminary report. Jerome A. Goldstein, Tulane University (809-81-105)
10:30-10:50  (321) A product formula for certain quadratic form perturbations. Rhonda J. Hughes, Bryn Mawr College (809-47-306)
11:00-11:20  (322) Maximal eigenvalues for Schrödinger and related operators. Evans M. Harrell II, Georgia Institute of Technology (809-47-171)

Thursday, January 26, 1984, 9:30 a.m.

Special Session on Homotopy Theory, II
10:00-10:20  (325) Deformation theory and local homological algebra. Preliminary report. James Stasheff, University of North Carolina, Chapel Hill (809-18-530)
10:30-10:50  (326) Stable splitting of \( \tilde{B}(Z/2)^3 \). Stephen A. Mitchell, Princeton University (809-55-546)
11:00-11:20  (327) Generalized group presentations and formal deformations of CW complexes. Preliminary report. Richard A. Brown, Carleton College (809-57-88)
11:30–11:50  (328)  K-theory of strict hensel rings and BGL (C discrete ) vs. BU. HENRI GILLET, University of Pennsylvania, and BOB THOMASON*, Johns Hopkins University (809-55-93)

Thursday, January 26, 1984, 9:30 a.m.

Session on Topologised Algebraic Structures
9:30– 9:40  (329)  A theory of fuzzy uniformities with applications to the fuzzy real lines. Preliminary report. S. E. RODABAUGH, Youngstown State University (809-54-176)
9:45– 9:55  (330)  On the Picard group of a compact complex nil-manifold. II. ROBERT J. FISHER, University of Oklahoma (809-22-190)
10:00–10:10  (331)  Weakening the topology of a disconnected Lie group. T. CHRISTINE STEVENS, Arkansas State University (809-22-308)
10:30–10:40  (333)  The lattice of semigroup compactifications. JOHN F. BERGLUND, Virginia Commonwealth University (809-22-76)
10:45–10:55  (334)  Semigroup compactifications of products of semigroups. PAUL MILNES, Virginia Commonwealth University (809-22-75)
11:00–11:10  (335)  The ideal structure of the space of k-uniform ultrafilters on a discrete semigroup. NEIL HINDMAN, Howard University (809-54-181)
11:15–11:25  (336)  Continuity of the group operation. S. A. NAIMPALLY, Lakehead University (809-54-163)
11:30–11:40  (337)  Isomorphic groups and homeomorphic spaces. Preliminary report. PREM L. SHARMA, Butler University (809-54-394)
11:45–11:55  (338)  Pro-Lie groups. ROBERT W. BAGLEY, University of Miami, T. S. WU, Case Western Reserve University, and J. S. YANG*, University of South Carolina, Columbia (809-22-106)

Thursday, January 26, 1984, 9:50 a.m.

Session on Graph Theory
10:05–10:15  (340)  A new proof of existence of an Euler tour in a connected graph with even degree vertices. PETER A. FOWLER, California State University, Hayward (809-05-326)
10:20–10:30  (341)  Shortest Hamiltonian walks on finite permutation groups. PETER TANNENBAUM, California State University, Fresno (809-05-100)
10:35–10:45  (342)  Switching sequences of graphs. Preliminary report. JOHN G. GIMBEL, Colby College (809-05-443)
10:50–11:00  (343)  Orbit polynomial graphs. Preliminary report. ROBERT A. BEEZER, University of Illinois, Urbana (809-05-166)
11:20–11:30  (345)  An application of directed circuits to series-parallel graphs. Preliminary report. WILLIAM FENTON, Bellarmine College (809-05-481)
11:50–12:00  (347)  Sequences of nested, self dual, discrete, harmonic, cubic sets of additive and subtractive colors which converge to the color continuum and their use in color separations for printing computer generated color patterns. E. P. MILES, Jr., Florida State University (809-00-440)

Thursday, January 26, 1984, 11:00 a.m.

Session on Control Theory
11:00–11:10  (348)  Boundary arcs for functional differential equations. V. L. BAKKE, University of Arkansas, Fayetteville (809-49-384) (Introduced by William A. Feldman)
11:15–11:25  (349)  The uniform approximation of relaxed trajectories by ordinary trajectories for control systems defined on an unbounded interval. DEAN A. CARLSON, University of Missouri, Rolla (809-49-247)
11:30–11:40  (350)  The hamiltonian along optimal solutions of differential inclusions. Preliminary report. BARBARA KASKOSZ* and EMILIO ROXIN, University of Rhode Island (809-49-316)
Thursday, January 26, 1984, 1:00 p.m.

Colloquium Lectures: Lecture II
1:00–2:00 (352) On the arithmetic of curves. II. BARRY MAZUR, Harvard University

Thursday, January 26, 1984, 2:15 p.m.

Report from the National Science Foundation
2:15–3:15 (353) The mathematical sciences at the National Science Foundation. JUDITH S. SUNLEY, National Science Foundation

Thursday, January 26, 1984, 4:00 p.m.

Bocher Prize Session and Business Meeting

Thursday, January 26, 1984, 7:00–10:00 p.m.

Joint Concerns Committee for Mathematics
7:00–10:00 (354) National meeting of department chairmen. BERNARD MADISON, JR., Moderator, University of Arkansas

Friday, January 27, 1984, 1:00 p.m.

Colloquium Lectures: Lecture III
1:00–2:00 (355) On the arithmetic of curves. III. BARRY MAZUR, Harvard University

Friday, January 27, 1984, 1:00 p.m.

Special Session on Partial Differential Equations and Optimal Control Problems, I
1:00–1:20 (356) Singular stochastic control and variational inequalities. JOSE-LUIS MENALDI, Wayne State University, and MAURICE ROBIN*, Institut National de Recherche en Informatique et en Automatique, Le Chesnay, France (809-49-111)
1:30–1:50 (357) Optimal sensor scheduling in nonlinear filtering of diffusion processes. Preliminary report. JOHN S. BARAS*, University of Maryland, College Park, and ALAIN BENSOUSSAN, University of Paris IX, France (809-60-402)
2:00–2:20 (358) Logarithmic transformations and optimal stochastic control. WENDELL H. FLEMING, Brown University (809-35-143)
2:30–2:50 (359) An exact optimum control for an adaptive control problem. RAYMOND RISHEL, University of Kentucky (809-49-466) (Introduced by Suzanne Lenhart)
4:00–4:20 (362) Steepest descent modified by controls. J. W. NEUBERGER, North Texas State University (809-49-57)

Friday, January 27, 1984, 1:00 p.m.

Special Session on Ordered Algebraic Structures, II
1:00–1:20 (363) The paraprojective hull of a lattice ordered group. Preliminary report. RICHARD N. BALL, Wesleyan University (809-06-257)
1:30–1:50 (364) Ordered loops and quasigroups—A survey. TREVIN EVANS, Emory University, Atlanta (809-06-333)
2:00–2:20 (365) Lexicographic extensions of lattice ordered groups. MARY E. HUSS, Simon Fraser University (809-06-156)
2:30–2:50 (366) The failure of the amalgamation property in varieties of representable ℓ-groups. WAYNE B. POWELL*, Oklahoma State University, and CONSTANTINE TSINAKIS, Vanderbilt University (809-06-258)
3:00–3:20 (367) Covers of the variety of abelian ℓ-groups. Preliminary report. WAYNE B. POWELL, Oklahoma State University, and CONSTANTINE TSINAKIS*, Vanderbilt University (809-06-259)
3:30–3:50 (368) d-Groups. Preliminary report. JORGE MARTINEZ, University of Florida (809-06-548)
4:00–4:20 (369) Epicomplete completely-distributive lattice-ordered groups. Preliminary report. MICHAEL R. DARNEL, University of Wisconsin, Eau Claire (809-06-334)
Friday, January 27, 1984, 1:00 p.m.

Special Session on Semigroup Theory, II

1:00–1:20 (370) Embedding into an H-class. MOHAN S. PUTCHA, North Carolina State University (809-20-16)

1:30–1:50 (371) Separate and joint continuity for semigroup actions. JIMMIE LAWSON, Louisiana State University, Baton Rouge (809-22-206)

2:00–2:20 (372) Action compatible orders. Preliminary report. R. D. KOPPERMAN*, City College, City University of New York, and F. A. SMITH, Kent State University (809-06-126)

2:30–2:50 (373) Relations on the lattice of congruences on a regular semigroup. Preliminary report. ROBERT J. KOCH, Louisiana State University, Baton Rouge, and BERNARD L. MADISON*, University of Arkansas, Fayetteville (809-20-421)

3:00–3:20 (374) Regular semigroups with isomorphic global semigroups. Preliminary report. BORIS M. SCHEIN, University of Arkansas, Fayetteville (809-20-351)

3:30–3:50 (375) Some order properties of the lattice of varieties of commutative semigroups. JORGE ALMEIDA, Simon Fraser University (809-20-46)

4:00–4:20 (376) Idempotent semigroups constructed from compact uniquely divisible semigroups. Preliminary report. D. R. BROWN* and J. W. STEFF, University of Houston, Houston (809-22-265)

4:30–4:50 (377) Semigroups of quotients and minimal right congruences. ROBERT H. OEHMKE, University of Iowa (809-20-264)

5:00–5:20 (378) The lattice of full regular subsemigroups of a regular semigroup. K. G. JOHNSTON*, Emory University, Atlanta, and P. R. JONES, Marquette University (809-20-134)

Friday, January 27, 1984, 1:00 p.m.

Special Session on Ill-Posed Problems, III

1:00–1:20 (379) Continuous dependence on geometry for the backward heat equation. PHILIP S. CROOKE, Vanderbilt University, and LAWRENCE E. PAYNE*, Cornell University (809-35-531)


2:00–2:20 (381) The parametric oscillator equation. Preliminary report. R. E. SHOWALTER, University of Texas, Austin (809-35-118)

2:30–2:50 (382) Laplace transform inversion: one more example of commuting operators. F. ALBERTO GRÜNBAUM, University of California, Berkeley (809-44-509)


3:30–3:50 (384) Regularized finite element methods for Fredholm equations of the first kind. C. W. GROETSCHEL* and J. GUACANEMI, University of Cincinnati, Cincinnati (809-65-06)

4:00–4:20 (385) Tikhonov's method of regularization for unbounded linear operator. Preliminary report. SUNG J. LEE*, University of South Florida, Tampa, and M. ZUHAIR NASHED, University of Delaware (809-47-09)


Friday, January 27, 1984, 1:00 p.m.

Special Session on Partial Differential Operators, IV


1:30–1:50 (388) Analytic structure and rates of convergence for variational methods in atomic and molecular physics. ROBERT NYDEN HILL* and JOHN D. MORGAN, III, University of Delaware (809-81-196)

2:00–2:20 (389) Perturbation theory and a general dominated convergence theorem for Feynman integrals. MICHEL L. LAPIDUS, University of Southern California (809-47-59)

2:30–2:50 (390) Dilation-analytic scattering operators for three particles. Preliminary report. CLASINE VAN WINTER, University of Kentucky (809-81-73)


3:30–3:50 (392) Commutators and propagation properties of Schrödinger operators. Preliminary report. ARNE JENSEN, University of Kentucky (809-35-159)

4:00–4:20 Problem Session

63
Session on Set-theoretic Topology

Friday, January 27, 1984, 1:15 p.m.

1:15 – 1:25 (393) On projective spaces in topology. Preliminary report. ANANDA V. GUBBI, University of Mississippi and Memphis State University (809-54-472)

1:30 – 1:40 (394) Product theorems for compact numbers. Preliminary report. GEORGE BALOGLOU, Wesleyan University (809-54-192)

1:45 – 1:55 (395) PMEA and the first countable countably paracompact spaces. Preliminary report. DENNIS K. BURKE, Miami University, Oxford (809-54-392)

2:00 – 2:10 (396) A non-locally connected continuum X such that C(X) is a retract of 2^X. JACK T. GOODYKOONTZ, Jr., West Virginia University (809-54-395) (Introduced by Donald F. Reynolds)

2:15 – 2:25 (397) Topological characterization of Wattenberg infinitesimals. NADER VAKIL, University of Washington (809-54-128)


2:45 – 2:55 (399) Completely regular extensions of topological spaces. Preliminary report. H. L. BENTLEY*, University of Toledo, and R. G. Ori, University of Durban-Westville, Republic of South Africa (809-54-393) (Introduced by V. Nagisetty)

3:00 – 3:10 (400) Weak continuity and strongly closed sets. DAVID A. ROSE, Francis Marion College (809-54-471)

3:15 – 3:25 (401) Weak convergence and W-sets. VAN C. NALL, University of the South (809-54-199) (Introduced by Sherwood F. Eby)

3:30 – 3:40 (402) A mean on an inverse limit space which is not an inverse limit mean. B. E. WILDER, Berry College (809-54-152) (Introduced by Ben Fitzpatrick, Jr.)


4:00 – 4:10 (404) Extension properties related to the Perin quasi-proximity class. HANS-PETER A. KÜNZI* and PETER FLETCHER, Virginia Polytechnic Institute and State University (809-54-01)

4:15 – 4:25 (405) Closure operators and diagonals. Preliminary report. HARRIET LAZOWICK LORD, California Polytechnic State University (809-54-188)

4:30 – 4:40 (406) Sections and selections. DAVID F. ADDIS, Texas Christian University, and LOUIS F. MCAFEE*, State University of New York, Binghamton (809-54-479)

4:45 – 4:55 (407) Countable metric spaces. Preliminary report. M. RAJAGOPALAN*, University of Toledo, and V. KANNAN, University of Hyderabad, India (809-54-498)

5:00 – 5:10 (408) Reflexive algebras and sigma-algebras. Preliminary report. TEODOR PRZYMUSINSKI and V. K. SRINIVASAN*, University of Texas, El Paso (809-28-136)

Friday, January 27, 1984, 1:15 p.m.

Session on Polynomials and Generalisations


1:30 – 1:40 (410) The attractive Coulomb potential polynomials. EDWARD BANK and MOURAD E. H. ISMAIL*, Arizona State University (809-33-10)

1:45 – 1:55 (411) Inequalities for the zeros of ultraspHERICAL polynomials. SHAHID AHMED, University of Southern Mississippi (809-33-174)

2:00 – 2:10 (412) Riccati type means convergence series arising from the biharmonic equation for the semi-infinite strip. Preliminary report. DAVID C. CHALLENER, University of Illinois, Urbana-Champaign (809-35-364)


2:30 – 2:40 (414) Uniform harmonic approximation on unbounded sets. Preliminary report. P. M. GAUTHIER*, Université de Montréal, and W. HENGARTNER, Universität Laval (809-31-547)


3:00 – 3:10 (416) A family of symmetric biadditive nonbilinear functions. KONRAD J. HEUVERS, Michigan Technological University (809-39-372)

3:15 – 3:25 (417) Local extrema for univalence criteria. JULIAN GEVIRTS, Universidad Católica de Chile (809-30-178)

3:30 – 3:40 (418) An SB null set of $\sigma$-finite linear measure is an AD null set. MICHAEL B. SCHMITZ, Eastern Illinois University (809-30-38)

3:45 – 3:55 (419) Essential spectra of certain pseudodifferential $C^*$-algebras on $\mathbb{R}^n$. HOUSHANG H. SOHRAB, University of Kansas (809-35-514)
4:00–4:10 (420) Subordination-preserving integral operators. SANFORD S. MILLER*, State University of New York, Brockport, PETRU MOCANU, Babes-Bolyai University, Romania, and MAXWELL O. READE, University of Michigan, Ann Arbor (809-30-447)

4:15–4:25 (421) Another case in Hummel’s result on Aharonov pairs. Preliminary report. CHRISTINE JUNG, Pennsylvania State University, Erie (809-30-354)

4:30–4:40 (422) On a lower bound for electrostatic capacitance. FRANKLIN LOWENTHAL*, California State University, Hayward, DONALD B. DAVIS, Lockheed, Sunnyvale, and MING KUO, General Electric, Schenectady (809-31-231)

Friday, January 27, 1984, 1:15 p.m.

Session on Number Theory
1:15–1:25 (423) Amicable pairs from pseudoamicable pairs. Preliminary report. DONALD J. BOYCE and DALE WOODS*, Central State University, Oklahoma (809-10-262)

1:30–1:40 (424) Small solutions of polynomial congruences. Preliminary report. TODD COCHRANE, University of Michigan, Ann Arbor (809-10-228)

1:45–1:55 (425) A new sequence with many properties. BRUCE REZNICK, University of Illinois, Urbana-Champaign (809-10-185)

2:00–2:10 (426) On heights in the Collatz 3n + 1 problem. Preliminary report. LYNN E. GARNER, Brigham Young University, Provo (809-10-85)


2:30–2:40 (428) Character sums associated to certain linear transformations. Preliminary report. PRISCILLA S. BREMSEER, United States Naval Academy (809-10-417)

2:45–2:55 (429) Elliptic analogues to the Bromwassell-Waldschmidt theorem. ROB TUBBS, Northern Arizona University (809-10-444)

3:00–3:10 (430) A counterexample to Mahler’s conjecture on best P-adic Diophantine approximation constants. Preliminary report. ALICE A. DEANIN, Villanova University (809-10-485)

3:15–3:25 (431) Theta series of quaternary quadratic forms over \( \mathbb{Z}[(1 + \sqrt{5})/2] \). DAVID C. HUNG, Ohio State University, Columbus (809-10-337)

3:30–3:40 (432) Algebraic numbers and topologically equivalent measures. KUODOU HUANG, Cameron University (809-12-203)

Friday, January 27, 1984, 1:15 p.m.

Session on Stability Theory and Mathematical Physics

1:30–1:40 (434) Weak gardens of Eden for 1-dimensional tessellation automata. MICHAEL D. TAYLOR, University of Central Florida (809-68-406)


2:00–2:10 (436) Directionally dependent asymptotic behavior of biharmonic functions with applications to elasticity. KENNETH B. HOWELL, University of Alabama, Huntsville (809-73-504)

2:15–2:25 (437) Hydromagnetic stability of rotating stratified compressible fluid flows. V. SRINIVASAN, P. KANDASWAMY and L. DRENNATH*, University of Central Florida (809-76-41)

2:30–2:40 (438) Exchange of stabilities for Gortler flow. ISOM H. HERRON, Howard University (809-76-167)


3:00–3:10 (440) Statistical mechanics of large coupled oscillator systems. JOHN NEU, University of New Mexico (809-82-49) (Introduced by Jim Mueller)


3:30–3:40 (442) State-space modeling and solutions by stochastic approximation. Preliminary report. CHE-PING LEE, California State Polytechnic University, Pomona (809-93-437)


4:00–4:10 (444) Normal forms for controllable nonlinear systems. THOMAS TAYLOR, Arizona State University (809-93-478)

4:15–4:25 (445) Information functions on open domain. IV. PL. KANANAPPAN, University of Waterloo (809-94-219)
4:30– 4:40 (446) Geometry, gravity and unification. THOMAS R. LOVE, College of Charleston (809-83-409)

Friday, January 27, 1984, 1:30 p.m.

Special Session on Incompressible Fluid Flow, II

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<th>Time</th>
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<th>Speaker(s)</th>
<th>Affiliation</th>
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<tr>
<td>1:30–</td>
<td>Steady vortex rings. Preliminary report. CHARLES J. AMICK, University of Chicago (809-76-506)</td>
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<td>2:00–</td>
<td>Hopf bifurcation in two component flow. MICHAEL RENARDY*, University of Wisconsin, Madison, and DANIEL D. JOSEPH, University of Minnesota, Minneapolis (809-76-54)</td>
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<td>2:30–</td>
<td>On the model equations which describe nonlinear wave motions in a rotating fluid. JONG UHN KIM, Virginia Polytechnic Institute and State University (809-76-142)</td>
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<td>3:00–</td>
<td>Three-dimensional, nonlinear wave interaction in water of constant depth. JOHN REEDER, University of Missouri, Columbia, and MARVIN SHINBROT*, University of Victoria (809-76-132)</td>
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<td>3:30–</td>
<td>Bifurcations among periodic water waves of small amplitude over a flat bottom in both 2- and 3-dimensions. Preliminary report. JOHN REEDER*, University of Missouri, Columbia, and MARVIN SHINBROT, University of Victoria (809-76-407)</td>
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<td>4:00–</td>
<td>Numerical analysis of time dependent flow structures generated by an impulsively started circular cylinder in slightly viscous incompressible fluids. Preliminary report. A. Y. CHEER, University of California, Berkeley (809-76-435)</td>
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<td>4:30–</td>
<td>The role of vorticity in singularity formation in ideal fluid flow. J. THOMAS BEALE*, Duke University, and T. KATO and A. MAJDA, University of California, Berkeley (809-76-505)</td>
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Invited Address

2:15– 3:15 (454) Card shuffling and group representations. PERSI DIACONIS, Stanford University (809-20-51)

Friday, January 27, 1984, 2:15 p.m.

Session on Manifolds

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<tr>
<th>Time</th>
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<th>Speaker(s)</th>
<th>Affiliation</th>
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<tr>
<td>2:15–</td>
<td>Families of quadratic forms associated to quadratic mappings of spheres. JOANN S. TURISCO, United States Naval Academy (809-12-110)</td>
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<td>2:30–</td>
<td>Complementary distributions which preserve the leaf geometry and applications to totally geodesic foliations. Preliminary report. ROBERT A. BLUMENTHAL* and JAMES J. HEBDA, St. Louis University (809-57-95)</td>
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<td>2:45–</td>
<td>A strange attractor in a three dimensional flow. Preliminary report. ITTAI KAN, University of Illinois, Urbana-Champaign (809-58-474)</td>
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<td>3:00–</td>
<td>Non-vanishing local cohomology classes. IRA MOSKOWITZ, Texas A&amp;M University, College Station (809-57-280)</td>
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<td>3:15–</td>
<td>Locally n-euclidean spaces in T2-space. T. M. ADENIRAN, University of Science and Technology, Nigeria (809-57-523)</td>
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<td>3:30–</td>
<td>Laminated decompositions involving a given submanifold. ROBERT J. DAVERMAN and FREDERICK C. TINSLEY*, University of Tennessee, Knoxville (809-57-396)</td>
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<td>3:45–</td>
<td>Decompositions into submanifolds with similar homology groups. ROBERT J. DAVERMAN* and J. WALSH, University of Tennessee, Knoxville (809-57-397)</td>
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<td>4:00–</td>
<td>A note on differentiable functions as cartesian products. MICHAEL R. COLVIN, California Polytechnic State University (809-55-91)</td>
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<td>4:15–</td>
<td>Maximal homotopy Lie subgroups of maximal rank. Preliminary report. JOHN A. FROHLIGER, Saint Norbert College (809-55-165)</td>
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<td>4:30–</td>
<td>Euler-Poincaré characteristic. C. C. HSUUNG, Lehigh University, and KEN SHISKOWSKI*, Eastern Michigan University (809-53-389)</td>
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<td>4:45–</td>
<td>Isometric immersions of non-negatively curved hypersurfaces in hyperbolic space. ROBERT J. CURRIER, University of Illinois, Urbana-Champaign (809-53-390)</td>
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<td>5:00–</td>
<td>On tight surfaces in 3-space. THOMAS E. CECIL*, College of the Holy Cross, and PATRICK J. RYAN, McMaster University (809-53-141)</td>
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<td>5:15–</td>
<td>A new approach to the stability of harmonic maps. Preliminary report. S. WALTER WEI, University of California, Los Angeles, and Michigan State University (809-53-525)</td>
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<td>5:30–</td>
<td>Continuity properties of the nonspacelike conjugate locus. Preliminary report. THOMAS G. POWELL, University of Missouri, Rolla (809-53-469)</td>
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<td>5:45–</td>
<td>Obstructions to homogeneity of a vector bundle. DAVID L. JOHNSON, Texas A&amp;M University, College Station (809-53-470)</td>
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Friday, January 27, 1984, 2:30 p.m.

Session on Algebra
2:45– 2:55 (471) The structure of generalized permanent semigroups. LEROY B. BEASLEY, Utah State University, and LARRY J. CUMMINGS*, University of Waterloo, Canada (809-15-526)
3:00– 3:10 (472) Expressing a polynomial as a sum of equal powers of linear binomials. BORIS Z. RAYKHSHTEYN, Bloomsburg State College (809-15-345)
3:30– 3:40 (474) Properness of Uλ implies the theorem of Ado and Iwasawa. WALTER J. MICHAELIS, Cleveland State University (809-16-164)
3:45– 3:55 (475) A partial order property for solvable Lie algebras. THOMAS A. FARMER, Miami University, Oxford (809-17-513)
4:00– 4:10 (476) Generalizing the Antoine-Speiser formula for A2 characters. Preliminary report. STEVEN N. KASS, University of Wisconsin, Madison (809-17-446) (Introduced by Georgia Benkart)
4:15– 4:25 (477) Odd symplectic groups and plane partition product identities. Preliminary report. ROBERT A. PROCTOR, University of California, Los Angeles (809-17-348)
4:30– 4:40 (478) Nilpotency in derivation alternator rings. Preliminary report. HARRY F. SMITH, Iowa State University (809-17-419)
4:45– 4:55 (479) Degree three identities. IRVIN ROY HENTZEL*, Iowa State University, and GIULIA MARIA PIACENTINI CATTANEO, University of Rome, Italy (809-17-68)
5:00– 5:10 (480) The construction of free categorical monoids and groups. ALEXANDRU SOLIAN, University of North Carolina, Charlotte (809-18-139)

Friday, January 27, 1984, 2:30 p.m.

Session on Banach Spaces
2:30– 2:40 (481) Small projections on l1(n). SIMON J. BERNAU, University of Texas, Austin (809-46-184)
2:45– 2:55 (482) Factoring compact and weakly compact operators through reflexive Banach lattices. C. D. ALIPRANTS and O. BURKINSHAW*, Indiana University–Purdue University, Indianapolis (809-47-30)
3:00– 3:10 (483) The reciprocal Dunford-Pettis property. Preliminary report. TOMMY LEAVELLE, North Texas State University (809-46-173) (Introduced by Paul Lewis)
4:00– 4:10 (487) Rotundity and extremity in Lebesgue-Bochner function spaces. Preliminary report. MARK A. SMITH, Miami University, Oxford (809-46-377)
4:15– 4:25 (488) Universal Pettis integrability. KEVIN T. ANDREWS, Texas A&M University, College Station (809-46-379)
4:30– 4:40 (489) Trigonometric series with bounded partial sums on a set and g*+. J. M. ASH* and ROGER L. JONES, DePaul University (809-42-376)
4:45– 4:55 (490) On the kernel of certain maximal operators on HP classes, 0 < p < 1. Preliminary report. JAMIL HASHMI, University of Illinois, Urbana-Champaign (809-42-429)
5:00– 5:10 (491) An interesting subset of C∞. ELIZABETH M. BATOR*, North Texas State University, and ROBERT E. HUFF, Pennsylvania State University, University Park (809-46-462)

Friday, January 27, 1984, 3:15 p.m.

Session on Applied Combinatorics and Game Theory
3:15– 3:25 (492) A trivalent specification of data types. ARTHUR KNOEBEL, New Mexico State University, Las Cruces (809-68-433)
4:00– 4:10 (495) Automata on Cayley graphs. MAXIMILIANO GARZON, University of Illinois, Urbana-Champaign (809-68-503)
4:15– 4:25 (496) Encoding using threshold tests. Preliminary report. PAUL C. SHIELDS, University of Toledo (809-94-283)

4:30– 4:40 (497) Concepts of solution with thresholds for cooperative n person games with side payments. IRINEL C. DRAGAN, University of Texas, Arlington (809-90-25)

4:45– 4:55 (498) Invariant optimal component configurations. Preliminary report. DAVID MALON, University of Kentucky (809-90-477)

5:00– 5:10 (499) The decision-maker’s payoff matrix. ELLEN TORRANCE, Stamford, Connecticut (809-90-436)

5:15– 5:25 (500) On final choice functions on a finite set. JIN BAI KIM, West Virginia University, Morgantown (809-90-411)


5:45– 5:55 (502) Some geodetic achievement and avoidance games on graphs. FRANK HARARY, University of Michigan, Ann Arbor (809-90-197)

Friday, January 27, 1984, 3:30 p.m.

Invited Address
3:30– 4:30 (503) Group actions on rings and generalized inner automorphisms. M. SUSAN MONTGOMERY, University of Southern California (809-16-269)

Friday, January 27, 1984, 3:30 p.m.

Special Session on Vector Field Systems and Control, III
3:30– 3:50 (504) Remarks on sampling of nonlinear systems. EDUARDO D. SONTAG, Rutgers University, New Brunswick (809-93-211)

4:00– 4:20 (505) A condition equivalent to global controllability in systems of vector fields. Preliminary report. KEVIN GRASSE, University of Oklahoma, Norman (809-93-44)

4:30– 4:50 (506) On the controllability of certain nonlinear systems. Preliminary report. FELIX ALBRECHT, University of Illinois, Urbana-Champaign (809-93-543)

5:00– 5:20 (507) Strong controllability in nonlinear systems. RON HIRSCHORN, Queen’s University (809-93-438) (Introduced by Henry Hermes)

5:30– 5:50 (508) Linearizations of nonlinear systems. Preliminary report. LOUIS R. HUNT* and RENJENG SU, Texas Tech University (809-93-42)

Saturday, January 28, 1984, 1:00 p.m.

Colloquium Lectures: Lecture IV
1:00– 2:00 (509) On the arithmetic of curves. IV. Barry MAzur, Harvard University

Saturday, January 28, 1984, 1:00 p.m.

Special Session on Partial Differential Equations and Optimal Control Problems, II
1:00– 1:20 (510) A PDE approach to some asymptotic problems concerning random differential equations with small noise intensities. L. C. EVANS*, University of Maryland, College Park, and H. Ishii, Chuo University, Japan (809-35-14)

1:30– 1:50 (511) Fine structure of some two dimensional viscosity solutions. Preliminary report. ROBERT JENSEN, University of Kentucky (809-35-536)


2:30– 2:50 (513) Optimal stochastic switching with small noise intensity. S. A. BELBAS, University of Maryland, College Park (809-35-457)

3:00– 3:20 (514) Bifurcation phenomena for certain systems of quasi-variational inequalities. STAVROS BELBAS, University of Maryland, College Park, and AGNES SULEM*, INRIA, France (809-35-491)

3:30– 3:50 (515) Nonlinear elliptic problems involving derivatives of the nonlinearity. JOSÉ CARILLO MENENDEZ, Universidad Complutense, Madrid, Spain, and MICHEL CHIPOT*, University of Maryland, College Park (809-35-123)

4:00– 4:20 (516) Shape optimization approach to numerical solution of the obstacle problem. ALEXANDER BOGOMOLNY*, University of Iowa, and JEAN HOU, Old Dominion University (809-49-216) (Introduced by Suzanne M. Lenhart)
Saturday, January 28, 1984, 1:00 p.m.

Special Session on Ordered Algebraic Structures, III
1:00– 1:20 (517) *A locally finitely presented simple orderable group.* Preliminary report. AKBAR RHEMTULLA, University of Alberta, Canada (809-06-535)
1:30– 1:50 (518) *Quantifier elimination in discriminator varieties.* FRANÇOISE Point, Mons University, Belgium, and Yale University (809-06-234) (Introduced by Andrew M. W. Glass)
2:00– 2:20 (519) *Free lattice ordered groups and vector lattices over generalized Boolean algebras.* PAUL CONRAD, University of Kansas (809-06-484)
2:30– 2:50 (520) *Applying diagrams to free lattice-ordered groups.* STEPHEN H. McCLEARY, University of Georgia (809-06-299)
3:00– 3:20 (521) *Additive structures of totally ordered semirings.* M. SATYANARAYANA, Bowling Green State University (809-06-332)
3:30– 3:50 Problem Session

Saturday, January 28, 1984, 1:00 p.m.

Special Session on Semigroup Theory, III
1:00– 1:20 (522) *Products of idempotents in finite full transformation semigroups: some improved bounds.* JOHN M. HOWIE, University of St. Andrews, Scotland (809-20-70)
1:30– 1:50 (523) *Almost biprefix codes.* GERARD LALLEMENT, Pennsylvania State University, University Park (809-20-267)
2:00– 2:20 (524) *Regular semigroups with inverse transversals. II.* Preliminary report. DONALD B. McALISTER* and ROBERT McFADDEN, Northern Illinois University (809-20-125)
2:30– 2:50 (525) *On inverses of products in regular semigroups.* R. J. KOCH, Louisiana State University, Baton Rouge (809-20-20)
3:00– 3:20 (526) *The translational degree of a semigroup.* Preliminary report. J. A. HILDEBRANT, Louisiana State University, Baton Rouge (809-20-92)
3:30– 3:50 (527) *The classification problem for compact UDC’s.* D. R. BROWN and J. W. STEPP*, University of Houston, Houston (809-22-266)
4:00– 4:20 (528) *Some isomorphism problems of power semigroups.* YUJI KOBAYASHI, North Carolina State University (809-20-205) (Introduced by Takayuki Tamura)

Saturday, January 28, 1984, 1:15 p.m.

Session on Complexes and Cells
1:30– 1:40 (530) *On the homology of finite free (Z/p)^n-complexes.* Preliminary report. RUSSELL LA PUMA, University of California, La Jolla (809-57-518)
1:45– 1:55 (531) *Hopf bifurcation in the presence of symmetry.* Preliminary report. IAN STEWART, University of Houston, Houston (809-58-510) (Introduced by M. Golubitsky)
2:00– 2:10 (532) *Chaos, periodicity and snake-like continua.* MARCY BARGE* and JOE MARTIN, University of Wyoming (809-58-220)
2:15– 2:25 (533) *General position properties satisfied by finite products of dendrites.* Preliminary report. PHILIP L. BOWERS, University of Tennessee, Knoxville (809-57-281)
2:30– 2:40 (534) *An alternate proof of Torunczyk’s characterization of Hilbert cube manifolds.* Preliminary report. JOHN J. WALSH, University of Tennessee, Knoxville (809-57-293)
2:45– 2:55 (535) *Lower simple-homotopy theory, a classical approach.* HANS J. MUNKHOLM*, University of Maryland, College Park, and D. R. ANDERSON, Syracuse University (809-57-296)
3:00– 3:10 (536) *Homogeneity of Menger k-dimensional universal compacta.* Preliminary report. MLADEN BESTVINA, University of Tennessee, Knoxville (809-57-301)
3:30– 3:40 (538) *Covering space by spheres.* N. J. A. SLOANE, Bell Laboratories, Murray Hill (809-52-177)

Saturday, January 28, 1984, 1:15 p.m.

Session on Numerical Methods and Approximation Theory
A descent method for moment problems and semi-infinite programs. WALTER CARRINGTON, University of Hartford (809-65-501)

An iterative method for solution of a boundary value problem in non-Newtonian fluid flow. C. D. LUNING, Sam Houston State University, and W. L. PERRY*, Texas A&M University, College Station (809-65-66)


A modification of Gaussian integration. R. SHERMAN LEHMAN, University of California, Berkeley (809-65-312)

A new method for the numerical solution of the Reynolds equation for gas lubricated slider bearings. MAHARAJA C. PANDIAN, University of Texas, Arlington (809-65-405)

Session on Banach Algebras


1:30–1:40 (548) Derivations from subalgebras of C*-algebras. Preliminary report. STEVE WRIGHT, Oakland University (809-46-534)

1:45–1:55 (549) Inner co-actions on C*-algebras. JOHN QUIGG, Arizona State University (809-46-463)

1:30–1:40 (541) An iterative method for solution of a boundary value problem in non-Newtonian fluid flow. C. D. LUNING, Sam Houston State University, and W. L. PERRY*, Texas A&M University, College Station (809-65-66)

2:00–2:10 (550) Subalgebras of H^*(D) and the corona property. JOHN H. RILEY, JR., Ohio Northern University (809-46-282)

2:15–2:25 (551) On the preduals of certain operator algebras. JULIAN SHEUNG, University of Hawaii, Honolulu (809-46-221)

2:30–2:40 (552) Divisibility in Douglas algebras. SHELDON AXLER, Michigan State University, and PAMELA GORKIN*, Bucknell University (809-46-193)

Saturday, January 28, 1984, 1:15 p.m.

Session on Differential Equations and Boundary Values, II

1:15–1:25 (553) Asymptotic behavior of solutions of a class of higher order ordinary differential equations. TAKASI KUSANO, Hiroshima University, Japan, and BHAGAT SINGH*, University of Wisconsin, Manitowoc (809-34-19)


1:45–1:55 (555) Compact, periodic and almost-periodic solutions of abstract differential equations. S. ZAIMDAN, Université de Montréal (809-34-05) (Introduced by C. Corduneanu)

2:00–2:10 (556) Disconjugacy, disfocality and differentiation with respect to boundary conditions. JOHNNY HENDERSON, University of Missouri, Rolla (809-34-151)

2:15–2:25 (557) On (k, n – k)-disconjugacy and Green’s functions for linear difference equations. Preliminary report. ALLAN C. PETERSON, University of Nebraska, Lincoln (809-34-230)

2:30–2:40 (558) Existence and uniqueness theorems for fourth order boundary value problems. Preliminary report. REZA AFTAB, Pan American University (809-34-449)


Saturday, January 28, 1984, 2:15 p.m.

Invited Address

2:15–3:15 (560) Intersection homology and its applications. ROBERT D. MACPHERSON, Brown University (809-55-544)

W. Wistar Comfort
Associate Secretary

Middletown, Connecticut
Second Announcement of the 810th Meeting

The eight hundred and tenth meeting of the American Mathematical Society will be held at the University of Notre Dame, Notre Dame, Indiana, on Friday and Saturday, April 6 and 7, 1984. Sessions will be held in the Notre Dame Center for Continuing Education (CCE).

Invited Addresses

By invitation of the 1983 Committee to Select Hour Speakers for Central Sectional Meetings there will be five invited one-hour addresses. The speakers, their titles, and the scheduled times of presentation are as follows:

GERD Faltings, Gesamthochschule Wuppertal, Arithmetic algebraic geometry, 9:30 a.m. Friday.

NIGEL J. Kalton, University of Missouri, Columbia, Three space problems in functional analysis, 1:45 p.m. Saturday.

PAUL G. Neumann, Ohio State University, Orthogonal polynomials, 11:00 a.m. Saturday.

KAREL L. Prikry, University of Minnesota, Minneapolis, The role of measurable cardinals in set theory and analysis, 1:45 p.m. Friday.

WILLIAM F. Schelter, University of Texas, Austin, Finitely generated algebras satisfying a polynomial identity, 11:00 a.m. Friday.

All five one-hour talks will be held in the auditorium of the Notre Dame Center for Continuing Education.

Special Sessions

By invitation of the same committee there will be five sessions of selected twenty-minute papers. The topics of these special sessions, the names of the mathematicians arranging them, and the tentative lists of speakers are as follows:

Orthogonal polynomials and their applications, THEODORE S. CHIHARA, Purdue University, Calumet. The tentative list of speakers includes Waleed A. Al-Salam, Michael Barnsley, Paul Erdös, Phillip Feinsilver, Walter Gautschi, Andrew Harrington, Mourad Ismail, Ferenc Móricz, John Nuttall, Mianur Rahman, Rong-Chyu Sheen, Dennis W. Stanton, Vilmos Totik, and Joseph L. Ullman.

Ring theory, BARBARA Cortzen, De Paul University. The tentative list of speakers includes Jeffrey M. Bergen, Victor P. Camillo, Kent R. Fuller, Joel K. Haack, Darrell E. Haile, Jeanne W. Kerr, Lenne G. Makar-Limanov, Peter Malcolmson, Mary Peles-Rosen, Jerry D. Rosen, and Gunnar Sigurdsson.


Most of the papers to be presented at these special sessions will be by invitation. However, anyone submitting an abstract for the meeting who feels that his or her paper would be particularly appropriate for one of these special sessions should indicate this clearly on the abstract and submit it by January 10, three weeks before the deadline for contributed papers.

Contributed Papers

There will also be sessions for contributed ten-minute papers as needed. Abstracts should be prepared on the standard AMS form available from the AMS office in Providence, or in departments of mathematics. Abstracts should be sent to the American Mathematical Society, P. O. Box 6248, Providence, Rhode Island 02940, so as to arrive prior to the abstract deadline of February 1, 1984. Members are reminded that a charge of $12 is imposed for retyping abstracts that are not in camera-ready form.

Council Meeting

The Council of the Society will meet at 7:00 p.m. on Thursday, April 5.

Symposium

Pseudodifferential Operators and Fourier Integral Operators with Applications to Partial Differential Equations

With the anticipated support of the National Science Foundation, a symposium on Pseudodifferential operators and Fourier integral operators with applications to partial differential equations is scheduled to take place Monday through Thursday, April 2–5. This topic was selected by the 1982 Committee to Select Hour Speakers for Central Sectional Meetings, whose members were Richard A. Askey, M. Salah Baouendi (chairman), Paul T. Bateman, R. H. Bing, and J. Ian Richards.
The Organizing Committee for the symposium includes Charles Fefferman, Princeton University; Victor W. Guillemin, Massachusetts Institute of Technology; Nancy K. Stanton, University of Notre Dame; Michael E. Taylor, SUNY, Center at Stony Brook; and François Treves (chairman), Rutgers University, New Brunswick.

There will be twelve one-hour talks devoted to one currently active area of research in PDE theory, and a number of more specialized 40-minute talks containing more details about important results obtained in recent years.

A partial list of speakers and participants, which includes only those who have accepted invitations, is:

- Shmuel Agmon (Hebrew University), Serge Alinhac (University of Paris-Sud), M. Salah Baouendi (Purdue University), Richard W. Beals (Yale University), R. Michael Beals (Rutgers University), Donald E. Catlin (Princeton University), Ronald R. Coifman (Yale University), Leon Ehrenpreis (Yeshiva University), Gregory Eskin (University of California, Los Angeles), Charles Fefferman, Peter C. Greiner (University of Toronto), Victor W. Guillemin, Lars Hörmander (University of Lund, Sweden), Carlos E. Kenig (University of Minnesota, Minneapolis), Joseph J. Kohn (Princeton University), Masatake Kuranishi (Columbia University), Richard B. Melrose (Massachusetts Institute of Technology), Yves Meyer (École Polytechnique, France), Duong Hong Phong (Columbia University), Jeffrey B. Rauch (University of Michigan, Ann Arbor), Michael C. Reed (Duke University), Linda Preiss Rothschild (University of California, San Diego), Pierre Schapira (University of Paris-Nord), Nancy K. Stanton, Elias M. Stein (Princeton University), David S. Tartakoff (University of Illinois, Chicago), and Michael Taylor (SUNY, Center at Stony Brook).

A complete list of speakers and the titles of their lectures will be included in the program of the symposium in the February issue of the Notices.

**Association for Symbolic Logic**

There will be a meeting of the Association for Symbolic Logic on Saturday and Sunday, April 7 and 8. Further details may be obtained from Julia F. Knight, Department of Mathematics, University of Notre Dame, Notre Dame, Indiana 46556.

**Registration**

The registration desk will be open from 8:30 a.m. until 4:00 p.m. Monday through Friday, and from 8:30 a.m. until 11:30 a.m. on Saturday at the Center for Continuing Education. Monday through Thursday the desk will be located in Room 112 (off the first floor lobby), and on Friday and Saturday it will be in the CCE lobby.

**Symposium Only**

- Nonmember $30
- Member $20
- Student/Unemployed $10

**Meeting Only**

- Nonmember $16

**Petition Table**

A petition table will be set up in the registration area. Additional information can be found in a box in the Louisville meeting announcement in this issue.

**Book Exhibits and Sale**

There will be an exhibit of assorted mathematics books offered by various publishers, and a sale at substantial discounts of recent books published by the American Mathematical Society. The exhibit and sale will be open during the same hours and in the same location as the registration desk Monday through Thursday. On Friday it will be located in Room 100 from 8:30 a.m. until 4:00 p.m., but will not be open on Saturday.

**Accommodations**

Blocks of rooms are being held for participants at the following area motels. Individuals should make their own reservations prior to the cut-off date of March 18, 1984, and should be sure to identify themselves as participants in the American Mathematical Society's meetings at Notre Dame's Center for Continuing Education. Rates listed are subject to change and do not include the 10 percent local tax.

**Budgeteer Motor Inn**

52825 U.S. 31 North, South Bend, Indiana 46637

- Single $23.95 Double $28.95

**Days Inn**

52757 U.S. 31 North, South Bend, Indiana 46637

- Single $26.88 Double $29.88

**Holiday Inn**

515 Dixie Way North, South Bend, Indiana 46637

- Single $41 Double $47

**Ramada Inn**

52890 U.S. 31 North, South Bend, Indiana 46637

- Single $33 Double $38

**South Bend Marriott Hotel**

123 N. St. Joseph Street, South Bend, Indiana 46601

- Single $52 Double $58

**The Morris Inn**

University of Notre Dame, Notre Dame, Indiana 46556

- Telephone 219-234-0141

- Single $41 Double $47

The Morris Inn is directly across the road from the Center for Continuing Education. All other hotels,
except for the Marriott, are approximately three miles north of the campus. Bus service is available from the Marriott, but a taxicab is necessary for persons not driving their cars to the meeting.

Food Service

The main dining room at the Morris Inn is open from 8:00 a.m. to 10:30 a.m. for breakfast, 11:30 a.m. to 2:00 p.m. for lunch, and from 5:00 p.m. to 8:30 p.m. for dinner Monday through Saturday; on Sunday the hours are from 8:00 a.m. to 2:00 p.m., and 5:00 p.m. to 8:00 p.m. Cafeteria-style service is available at the Oak Room of the South Dining Hall, which is a five-minute walk west from the Morris Inn, from 7:00 a.m. to 7:00 p.m. daily; Monday through Saturday it reopens from 8:00 a.m. to midnight. The Huddle in LaFortune Center (a five-minute walk north from the Center for Continuing Education) operates from 8:00 p.m. to midnight Monday through Saturday, and from noon to midnight on Sunday.

Many fine restaurants are located in the area but, unfortunately, they are not within walking distance from the campus. A list of these restaurants will be available at registration.

Parking

The conference parking lot is located directly behind the Center for Continuing Education, where there is a daily fee of 75 cents. Guests staying at the Morris Inn may park there at no charge. All of the off-campus motels also maintain parking areas for their guests, but public transportation (except taxi service) is not available to the campus from all of them.

Transportation

The Center for Continuing Education is located at the main gate of the campus on Notre Dame Avenue, across the road from the University's Morris Inn. The campus is about ninety miles east of Chicago, and five minutes from the Indiana Toll Road (Interstate 80/90). South Bend, immediately south of Notre Dame, is served by the interurban South Shore Railroad from Chicago, and by Amtrak trains (from east and west) daily. Airline service to the local Michiana Regional Airport is provided primarily by commuter lines from Chicago, Cleveland, Detroit, and Indianapolis via Britt, Air Wisconsin, and Republic, in addition to service via United and Piedmont Airlines. Limousine service is available between the campus and the airport. In addition, United Limo provides service between Chicago's O'Hare Airport and the Notre Dame campus or area hotels. The current one-way fare is $22 per person and advance reservations are suggested. From outside Indiana the toll free telephone number to call for information and reservations is 800-833-5555, and from within Indiana it is 800-332-7323.

Paul T. Bateman
Associate Secretary

Urbana, Illinois

CONTEMPORARY MATHEMATICS

Low Dimensional Topology

Samuel J. Lomonaco, Jr., Editor

This volume arose from a special session on Low Dimensional Topology organized and conducted by Dr. Lomonaco at the American Mathematical Society meeting held in San Francisco, California, January 7-11, 1981.

Contents

Joan S. Birman and R. F. Williams, Knots holders for symmetric knots
Steven A. Bleiler, Doubly prime knots
Joe Brandenburg, Micheal Dyer, and Ralph Strebel, On J. H. C. Whitehead's aspherical question II
Roger Fenn and Denis Sjerve, Geometric cohomology theory
Ronald Fintushel and Ronald J. Stern, Seifert fibered 3-manifolds and nonorientable 4-manifolds
Michael H. Freedman, A conservative Dehn's lemma
David Gabai, The Murasugi sum is a natural geometric operation

Prepayment is required for all AMS publications. Order form AMS, P.O. Box 1571, Annex Station, Providence, R1 02901, or call toll free 800-556-7774 to charge with Visa or MasterCard.
Second Announcement of the 811th Meeting

The eight hundred and eleventh meeting of the American Mathematical Society, scheduled jointly with the Maryland–District of Columbia–Virginia Section of the Mathematical Association of America, will be held at Virginia Commonwealth University, Richmond, Virginia, on Friday and Saturday, April 13–14, 1984.

Invited Addresses

By invitation of the 1983 Committee to Select Hour Speakers for Southeastern Sectional Meetings, there will be three AMS invited one-hour addresses. The speakers, their affiliations, and titles of their talks are as follows:

BÉLA BALLOBÁS, Louisiana State University, Random graphs.

THOMAS F. BANCHOFF, Brown University, Interactive computer graphics in differential geometry teaching and research.

JOHN J. WALSH, University of Tennessee, Knoxville, Detecting infinite dimensional manifolds homologically.

Professor Banchoff is jointly invited by the AMS and MAA to address a joint meeting at Richmond, Virginia 23220.

Special Sessions

By invitation of the same committee, there will be three special sessions of selected twenty-minute papers. The topics of these special sessions and the names of the organizers are:

Field theory, JAMES K. DEVENEY, Virginia Commonwealth University. Low dimensional topology, WILBUR WHITTEN, University of Southwestern Louisiana.

Applied mathematics, TAI PING LIU, University of Maryland, College Park.

Most of the papers to be presented at these special sessions will be by invitation. However, anyone submitting an abstract for the meeting who feels that his or her paper would be particularly appropriate for one of these special sessions should indicate this clearly on the abstract and submit it by January 16, three weeks before the deadline for contributed papers, in order that it may be considered for inclusion.

Contributed Papers

There will also be sessions for contributed ten-minute papers. Abstracts should be prepared on the standard AMS form available from the AMS office in Providence, or in departments of mathematics. Abstracts should be sent to the American Mathematical Society, P. O. Box 6248, Providence, Rhode Island 02940, so as to arrive prior to the abstract deadline of February 6, 1984. Members are reminded that a charge of $12 is imposed for retyping abstracts that are not in camera-ready form.

Other Activities

In conjunction with the joint AMS-MAA sectional meetings, Virginia Commonwealth University will host a mini-symposium on Analysis on Semigroups, coordinated by J. F. Berglund, P. Milnes and H. D. Junghenn. The mini-symposium will be held on April 12 and 13. Persons interested in participating should contact J. F. Berglund, Mathematical Sciences Department, Virginia Commonwealth University, Richmond, Virginia 23284.

Registration

The location of the meeting registration desk, and the hours during which the desk will be open, will be announced in the February issue of the Notices. The registration fees, which will apply for this joint meeting only, are $5 for members of the AMS or MAA, $8 for nonmembers, and $5 for students or unemployed mathematicians.

Petition Table

A petition table will be set up in the registration area. Additional information can be found in a box in the Louisville meeting announcement in this issue.

Accommodations

Sleeping rooms have been blocked at the Holiday Inn-Downtown. Participants who wish to reserve rooms there must write to Mrs. Patricia Worley at the Division of Continuing Studies, Virginia Commonwealth University, 301 West Franklin Street, Richmond, Virginia 23220, or telephone her at 804-786-0342 Monday through Friday between 8:30 a.m. and 4:30 p.m. The deadline for these reservations is March 23, 1984. Rates are firm but do not include applicable 6 percent tax.

Holiday Inn-Downtown (5 blocks from campus)
301 West Franklin Street, Richmond
Telephone: 804-644-9871

Single $35  Double $40

Rooms have also been blocked at the following location. Individuals should make their own reservations directly with the Quality Inn and identify themselves as participants in the AMS-MAA meeting in order to obtain these special rates. The deadline for reservations is March 23, 1984. Rates are subject to change, and do not include applicable tax.

Quality Inn Commonwealth (2 blocks from campus)
515 West Franklin Street, Richmond
Telephone: 804-643-2831 or 800-228-5151

Single $28  Double $36

Although rooms have not been blocked at the following locations, they are included here for information purposes.
A banquet will be held on Friday evening at the Holiday Inn. The cost will be $16, and includes the beer party which follows immediately after. The cost for the beer party only is $4, for those who do not wish to attend the banquet. Checks in the appropriate amount should be made payable to the MAA and sent to John Schmeek, Department of Mathematical Sciences, Virginia Commonwealth University, 1015 W. Main Street, Richmond, Virginia 23248 so as to arrive by March 23, 1984.

A bus tour to historic sites in Richmond is tentatively scheduled on Saturday from approximately 9:30 a.m. to 12:30 p.m. at a cost of $10 per person.

Preregistration will determine whether or not there is sufficient interest to finalize arrangements, and refunds will be issued if the tour is cancelled. Please make checks payable to the MAA and send to John Schmeek at the above address so as to also arrive by March 23.

Travel and Local Information
Several airlines provide service to and from Richmond. Groomes Transportation Service operates from the airport to most parts of the city at a cost of about $10 per person. Taxi service to and from the airport is also available.

The weather in April should be mild and pleasant, with temperatures averaging 60°F.

Free parking is provided for guests at the Holiday Inn-Downtown, and on-street parking is usually available on campus during the weekend. The University parking deck is located at the corner of West Main and S. Laurel Street (one block from the meeting area), where there might be a parking fee.

New Orleans, Louisiana
Frank T. Birtel
Associate Secretary

---

Topological Methods in Nonlinear Functional Analysis
S. P. Singh, S. Thomeier, and B. Watson, Editors

This volume contains the proceedings of the special session on Fixed Point Theory and Applications held during the Summer Meeting of the American Mathematical Society, at the University of Toronto on August 21-26, 1982. The theory of contractors and contractor directions is developed and used to obtain existence theory under rather weak conditions. Theorems on the existence of fixed points of nonexpansive mappings and the convergence of the sequence of iterates of nonexpansive and quasi-nonexpansive mappings are given. Degree of mapping and its generalizations are given in detail. A class of eventually condensing mappings is studied and multivalued condensing mappings with multiple fixed points are also given. Topological fixed points including the study of the Nielsen number of a selfmap on a compact surface, extensions of a well-known result of Krasnosel'skii's Compression of a Cone Theorem, are given. Also, fixed points, antipodal points, coincidences of multifunctions are discussed. Several results with applications in the field of partial differential equations are given. Application of fixed point theory in the area of Approximation Theory is also illustrated.

Papers by the following are included:
- M. Altman
- F. E. Browder
- R. F. Brown
- E. R. Fadell
- G. Fournier
- K. Goebel
- M. von Golitschek
- E. R. Fournier
- W. A. Kirk
- M. Altman
- S. A. Naimpally, and J. H. W. Whitfield
- P. L. Papini
- W. V. Petryshyn
- S. Reich
- B. E. Rhoades
- H. Schirmer
- V. M. Sehgal, S. P. Singh, and B. Watson
- V. M. Sehgal
- R. Guazzardi
- D. S. Jaggi
- M. Martelli
- and C. Waters

1980 Mathematics Subject Classifications: 54H25, 47Hxx.

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The 1984 Joint Summer Research Conferences in the Mathematical Sciences will be held at Bowdoin College, Brunswick, Maine, between June 10 and August 18, 1984. It is anticipated that the series of week-long conferences will be supported by a grant from the National Science Foundation.

There will be ten one-week conferences in ten different areas of mathematics. Each week participants will arrive on Sunday and leave the following Saturday. The topics and organizers for the ten conferences were selected by the AMS-IMS-SIAM Committee on Joint Summer Research Conferences in the Mathematical Sciences. The selections were based on suggestions made by the members of the committee, by members of the Council of the AMS and others. The committee considered it important that the conferences represent diverse areas of mathematical activity, with emphasis on areas currently especially active, and paid careful attention to subjects in which there is important interdisciplinary activity at present.

The conferences will be similar in structure to those held throughout the year at Oberwolfach. These conferences are intended to complement the Society’s program of annual Summer Institutes and Summer Seminars, which have much larger attendance and are substantially broader in scope. The conferences are research conferences, and are not intended to provide an entree to a field in which a participant has not already worked.

It is expected that funding will be available for about thirty participants in each conference. Others, in addition to those funded, will be welcome, within the limitations of the facilities of the campus. Up to about seventy participants can be accommodated at each conference. Housing accommodations will be available on campus for those attending the conference, and daily meals will be served in a dining hall near the dormitories. A brochure describing the facilities available at Bowdoin College will be available from the AMS office in March 1984. The brochure will include information on firm room rates and the residence and dining hall facilities, as well as local information and a reservation form to be used for accommodations on campus. Each participant will pay a registration fee, and a social fee to cover the cost of refreshments served at breaks and for social events.

Those interested in attending one of the conferences should request an application form from Carole Kohanski, Summer Research Conference Coordinator, American Mathematical Society, Post Office Box 6248, Providence, RI 02940 (401-272-9500, extension 286), specifying which conference they wish to attend. Selection of the participants and approval of participant support will be made by the Organizing Committee for each conference. Women and members of minority groups are encouraged to apply and to participate in these conferences. The deadline for receipt of applications is January 16, 1984. Those who wish to apply for a grant-in-aid should indicate the application form; however, funds available for these conferences are limited and so individuals who can obtain support from other sources should do so.

The Joint Summer Research Conferences in the Mathematical Sciences are under the direction of the AMS-IMS-SIAM Committee on Summer Research Conferences in the Mathematical Sciences which includes: Benedict Gross, Malcolm R. Leadbetter, Angus J. Macintyre, Jerrold E. Marsden, James McKenna, Evelyn M. Nelson, Katsumi Nomizu, Julius Shaneson, R. O. Wells, Jr. (chairman), and Shmuel Winograd.

Descriptions of the subject matter of each of the 1984 Conferences appeared in the October Notices, pages 663 to 665; they were accompanied by lists of members of the respective organizing committees.

June 10 to June 16
New multivariate methods in statistics
PETER HUBER (Harvard University), Chairman

June 17 to June 23
Random matrices and their applications
JOEL COHEN (Rockefeller University), Chairman

June 24 to June 30
The mathematics of phase transitions
RICHARD DURRETT (University of California, Los Angeles), Chairman

July 1 to July 7
Aspherical complexes
KENNETH BROWN (Cornell University), Co-Chairman
F. T. FARRELL (University of Michigan, Ann Arbor), Co-Chairman

July 8 to July 14
Group actions on rings
SUSAN MONTGOMERY (University of Southern California), Chairman

July 15 to July 21
Diophantine problems, including diophantine equations, diophantine approximation, and transcendency
D. J. LEWIS (University of Michigan, Ann Arbor), Co-Chairman
W. M. SCHMIDT (University of Colorado, Boulder), Co-Chairman

July 22 to July 28
The Selberg trace formula and related topics
AUDREY TERRAS (University of California, San Diego), Chairman

July 29 to August 4
Linear algebra and its role in systems theory
Biswa Nath DATTA (Northern Illinois University), Chairman

August 5 to August 11
Integral geometry
ROBERT L. BRYANT (Rice University), Chairman

August 12 to August 18
Complex differential geometry and non-linear differential equations
Y. T. Sù (Harvard University), Chairman
1984 Summer Seminar
In Applied Mathematics

Nonlinear Systems of PDE
in Applied Mathematics

July 8 - July 21, 1984
College of Santa Fe
Santa Fe, New Mexico

The sixteenth AMS-SIAM Summer Seminar in Applied Mathematics will be held July 8 - July 21, 1984, and will take place at the College of Santa Fe, Santa Fe, New Mexico. The seminar will be sponsored jointly by the American Mathematical Society and the Society for Industrial and Applied Mathematics. It is anticipated that it will be supported by a grant from a federal agency. The topic Nonlinear systems of PDE in Applied Mathematics was selected by the AMS-SIAM Committee on Applied Mathematics whose members at the time were R. W. Brockett, John E. Dennis, Jr., Norman Lebowitz, Alan C. Newell, (chairman), George C. Papanicolaou, and R. S. Warming.

The seminar will address three major subtopics of nonlinear systems of partial differential equations in applied mathematics: hyperbolic systems, completely integrable systems, and evolutionary systems of nonlinear partial differential equations. Recent progress has been pushed by interrelated developments in dynamical systems theory, Hamiltonian structure, and soliton theory. The interplay of these developments with the theory of hyperbolic systems and evolutionary systems will be stressed.

Lecture topics and speakers will be selected by the Organizing Committee and Advisory Committee.

The members of the Organizing Committee are Darryl D. Holm, James M. Hyman, and Basil Nicolaenko (chairman), all of the Center for Nonlinear Studies, Los Alamos National Laboratory. Members of the Advisory Committee are: Peter D. Lax, Courant Institute, New York University; J. L. Lions, Collège de France, Paris; Jerrold Marsden, University of California, Berkeley; David McLaughlin, University of Arizona; Louis Nirenberg, Courant Institute of the Mathematical Sciences, New York University; and Isadore M. Singer, University of California, Berkeley.

In the early spring a brochure will be available from the AMS office which will include a description of the scientific program, as well as information on the residence and dining hall facilities, with firm room and board rates, local information, and a reservation form to be used to obtain accommodations on campus. Each participant will pay a social fee to cover the cost of refreshments served at breaks and for social events. There will also be a meeting registration fee.

Individuals may apply for admission to the seminar. Application blanks for admission and/or financial assistance can be obtained from the Meetings Department, American Mathematical Society, P. O. Box 6248, Providence, Rhode Island 02940. The deadline for return of applications is March 2, 1984. An applicant should have completed at least one year of graduate school and will be asked to indicate his or her scientific background and interest. A graduate student's application must be accompanied by a letter from his or her faculty advisor concerning the applicant's ability and promise. Those who wish to apply for a grant-in-aid should so indicate; however, funds available for the seminar are limited and individuals who can obtain support from other sources should do so.

Geometrical Methods
in Congruence Modular Algebras
H. Peter Gumm

Abstract

The author develops a geometric approach to algebras in congruence modular varieties. The idea of coordinatization of lines in affine geometry finds an almost perfect analog in the coordinatization of algebras. The geometry is the congruence class geometry, i.e. the subspaces are the blocks of congruence relations.

It is shown that congruence modularity guarantees that the congruence class geometry behaves nicely, because the Desarguesian and the Pappian theorems are true, if interpreted correctly. The innocuous looking "Shifting Lemma" is the basic and powerful tool we need.

The obstacle to a perfect coordinatization is a congruence relation called the "commutator." The commutator is zero iff nonparallel lines have precisely one point of intersection. This approach leads to a simple geometric development of commutator theory for arbitrary congruences. Results about affine algebras on the one hand and about distributive varieties on the other hand are tied together where only the commutator appears as a parameter. For the extreme values of this parameter we find theorems about affine, nilpotent and solvable congruences and varieties at one end and theorems generalizing Jónsson's lemma at the other end. A radical, \( \sqrt{A} \), is defined and we show that Jónsson's lemma is true for every algebra \( A/\sqrt{A} \).

1980 Mathematics Subject Classifications: 08B10, 08B05, 08A30, 08A05.

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The thirty-second Summer Research Institute sponsored by the American Mathematical Society will be devoted to geometric measure theory and the calculus of variations. It will take place at Humboldt State University in Arcata, California, from July 16 to August 3, 1984. Members of the Organizing Committee include William K. Allard and Frederick J. Almgren, Jr. (co-chairmen), Enrico Bombieri, Robert M. Hardt, H. Blaine Lawson, Jr., Jon T. Pitts, Richard Schoen, and William P. Ziemer. It is anticipated that the institute will be partially supported by a grant from the National Science Foundation.

The topic was selected by the 1983 Committee on Summer Institutes, whose members were Michael Artin, Thomas H. Brylawski, Robert Osserman (chairman), George C. Papanicolaou, Harold M. Stark, and Stephen Wainger.

Many new ideas have been introduced recently into geometric measure theory and the calculus of variations. Among the topics the institute will cover are:

(a) The new regularity results of Almgren showing that area minimizing integral currents in manifolds have singular sets of codimension at least two; the associated functional analysis which serves as a general tool for the study of general branching behavior; Solomon's application of some of this analysis to give a new proof of the compactness theorem for integral currents.

(b) The complex of ideas introduced and applied by Schoen and Yau and others showing unexpected connections between minimal surfaces and positive scalar curvature in a variety of contexts.

(c) The program of Harvey and Lawson for the study of the calibrated geometries associated to facets of the unit mass ball in exterior algebra.

(d) The program of Pitts for stability analysis and further applications of variational methods in the large for higher dimensional problems; relevant to this line of research are Allard's new estimates for arbitrary elliptic integrands.

(e) The very recent results of White effectively reducing higher dimensional domain parametric mapping problems to the study of the structure of singularities of minimizing currents, in the sense that when enough minimizing current regularity is known the corresponding mapping problem is solved.

(f) The use of integral geometric and probabilistic methods in the variational calculus by Morgan, Nance and White, and the utilization of these methods in explicit machine computations by Parks and Super.

Housing accommodations will be available in the campus residence halls for participants and their families, and meals will be served daily in the adjacent dining hall. Although the Humboldt campus is hilly and difficult for handicapped persons to negotiate, facilities are accessible to the handicapped.

In the spring a brochure will be mailed to all who are invited to attend. It will include information about the scientific program, the residence and dining facilities, firm room and board rates, as well as travel and local information and a reservation form for housing accommodations at HSU. Each participant will pay a social fee to cover the cost of refreshments served at breaks and for social events, in addition to a meeting registration fee. Funds for support will be limited and, therefore, it will be necessary for many participants to obtain their own funds. Anyone who wishes to receive an invitation to participate in the institute and/or be considered for financial assistance should write to Mrs. Dorothy Smith, American Mathematical Society, P. O. Box 6248, Providence, Rhode Island 02940 prior to April 16, 1984. The Organizing Committee will consider those requests and applicants will be informed if funds are available to provide support.
Invited Speakers and Special Sessions

Invited Speakers at AMS Meetings

The individuals listed below have accepted invitations to address the Society at the times and places indicated. For some meetings, the list of speakers is incomplete.

Notre Dame, April 1984
- Gerd Faltings
- Nigel J. Kalton
- Paul G. Nevai
- Karel L. Prikry
- William F. Schelter

Richmond, April 1984
- Béla Ballobás
- Thomas F. Banchoff
- John J. Walsh

Plymouth, June 1984
- David Catlin
- Jonathan Rosenberg

Eugene, August 1984
- Ralph Cohen
- Ralph Greenberg
- Yiannis Moschovakis
- Paul H. Rabinowitz

Minneapolis, November 1984
- Jerry L. Bona
- I. Martin Issacs

Organizers and Topics of Special Sessions

The list below contains all the information about Special Sessions at meetings of the Society available at the time this issue of the Notices went to the printer.

The section below entitled Information for Organizers describes the timetable for announcing the existence of Special Sessions.

April 1984 Meeting in Notre Dame
Central Section
Deadline for organizers: Expired
Deadline for consideration: January 10, 1984
- Theodore S. Chihara, Orthogonal polynomials and their applications
- Barbara Cortzen, Ring theory
- Julia F. Knight, Model theory
- N. Tenney Peck, Metric linear function spaces
- T. K. Puttaswamy, Differential equations

April 1984 Meeting in Richmond
Southeastern Section
Deadline for organizers: Expired
Deadline for consideration: January 16, 1984
- James K. Deveney, Field theory
- Wilbur Whitten, Low dimensional topology
- Tai Ping Liu, Applied mathematics

June/July 1984 Meeting in Plymouth
Eastern Section
Deadline for organizers: Expired
Deadline for consideration: April 2, 1984
- Amatari Regev, Combinatorial ring theory
- Jonathan Rosenberg, C*-algebras in topology/geometry

August 1984 Meeting in Eugene
Associate Secretary: Frank T. Birtel
Deadline for organizers: Expired
Deadline for consideration: May 15, 1984
- Ralph Cohen, Algebraic topology

November 1984 Meeting in Minneapolis
Central Section
Deadline for organizers: January 15, 1984
Deadline for consideration: To be announced
- Marian B. Pour-El, Logic

November 1984 Meeting in San Diego
Far Western Section
Deadline for organizers: January 15, 1984
Deadline for consideration: To be announced
- S.-Y. A. Chang, Classical harmonic analysis
- Carl Cunningham and David Lesley, Complex analysis
- T. Enright and J. Wolf, Representations of semi-simple Lie groups

Fall 1984 Meeting
Eastern Section
Deadline for organizers: February 15, 1984
Deadline for consideration: To be announced

Fall 1984 Meeting
Southeastern Section
Deadline for organizers: February 15, 1984
Deadline for consideration: To be announced

January 1985 Meeting in Anaheim
Associate Secretary: Hugo Rossi
Deadline for organizers: April 15, 1984
Deadline for consideration: To be announced

March 1985 Meeting in Chicago
Central Section
Deadline for organizers: June 15, 1984
Deadline for consideration: To be announced

April 1985 Meeting in Tucson
Far Western Section
Deadline for organizers: July 15, 1984
Deadline for consideration: To be announced

Information for Organizers

Special Sessions at Annual and Summer meetings are held under the general supervision of the Program Committee. They are administered by the Associate Secretary in charge of the meeting with staff assistance from the Society office in Providence.

Some Special Sessions arise from an invitation to a proposed organizer issued through the Associate
Send Proposals for Special Sessions to the
Associate Secretaries

The programs of sectional meetings are arranged by
the Associate Secretary for the section in question:

**Far Western Section (Pacific and Mountain)**
Hugo Rossi, Associate Secretary
Department of Mathematics
Institute for Advanced Study
Princeton, NJ 08540
(Telephone 609-734-8157)

**Central Section**
Robert M. Fossum, Associate Secretary Presumptive
Department of Mathematics
University of Illinois
1409 West Green Street
Urbana, IL 61801
(Telephone 217-333-3975)

**Eastern Section**
W. Wistar Comfort, Associate Secretary
Department of Mathematics
Wesleyan University
Middletown, CT 06457
(Telephone 203-347-9411)

**Southeastern Section**
Frank T. Birtel, Associate Secretary
Department of Mathematics
Tulane University
New Orleans, LA 70118
(Telephone 504-865-5646)

As a general rule, members who anticipate organizing
Special Sessions at AMS meetings are advised to seek
approval at least nine months prior to the scheduled date
of the meeting. No Special Sessions can be approved
too late to provide adequate advance notice to members
who wish to participate.

Special Sessions are effective at sectional meetings
and can usually be accommodated. They are arranged
by the Associate Secretary under the supervision of
the Committee to Select Hour Speakers for the
section. The limitation on the number of sessions
depends on the space and time available. The same
restriction as for national meetings applies to the
deadline for announcing Special Sessions at sectional
meetings: no Special Session may be approved too late for its announcement to appear in time to
allow a reasonable interval for members to prepare
and submit their abstracts prior to the special early
deadline set for consideration of papers for Special
Sessions.

**Information for Speakers**

A great many of the papers presented in Special
Sessions at meetings of the Society are invited papers,
but any member of the Society who wishes to do
so may submit an abstract for consideration for
presentation in a Special Session, provided it is
received in Providence prior to the special early
deadline announced above and in the announcements
of the meeting at which the Special Session has been
scheduled.

Abstracts of papers submitted for consideration for
presentation at a Special Session must be received
by the Providence office (Editorial Department,
American Mathematical Society, Post Office Box
6248, Providence, RI 02940) by the special deadline
for Special Sessions, which is usually three weeks
earlier than the deadline for contributed papers for
the same meeting. The Council has decreed that no
paper, whether invited or contributed, may be listed
in the program of a meeting of the Society unless an
abstract of the paper has been received in Providence
prior to the deadline.

**Call for Invitations**

The undersigned Associate Secretary hereby
solicits invitations from institutions interested in
serving as host to a future meeting (Eastern Section)
of the Society.

Among desirable characteristics for the site of a
sectional meeting are:

(a) Accessibility via public transportation;

(b) Availability of inexpensive food and lodging
on or near campus;

(c) Minimal cost (normally nil) to the Society
for the use of classrooms and other facilities; and

d) A couple of energetic local mathematicians
willing to serve as an Arrangements Committee.

Planning for a sectional meeting begins ap-
proximately two years in advance of the meeting
itself. At the moment we seek sites for meetings in
the Spring and the Fall of 1985. Exact dates are
flexible and negotiable.

Exploratory correspondence may be addressed
to W. W. Comfort, Associate Secretary, AMS,
Department of Mathematics, Wesleyan University,
Middletown, Connecticut 06457.
Special Meetings

THIS SECTION contains announcements of meetings of interest to some segment of the mathematical public, including \textit{ad hoc}, local, or regional meetings, and meetings or symposia devoted to specialised topics, as well as announcements of regularly scheduled meetings of national or international mathematical organizations. (Information on meetings of the Society, and on meetings sponsored by the Society, will be found inside the front cover.)

AN ANNOUNCEMENT will be published in the \textit{Notices} if it contains a call for papers, and specifies the place, date, subject (when applicable), and the speakers; a second full announcement will be published only if there are changes or necessary additional information. Once an announcement has appeared, the event will be briefly noted in each issue until it has been held and a reference will be given in parentheses to the month, year and page of the issue in which the complete information appeared.

IN GENERAL, announcements of meetings held in North America carry only date, title of meeting, place of meeting, names of speakers (or sometimes a general statement on the program), deadlines for abstracts or contributed papers, and source of further information. Meetings held outside the North American area may carry more detailed information. All communications on special meetings should be sent to the Editor of the \textit{Notices}, care of the American Mathematical Society in Providence.

DEADLINES for entries in this section are listed on the inside front cover of each issue. In order to allow participants to arrange their travel plans, organisers of meetings are urged to submit information for these listings early enough to allow them to appear in more than one issue of the \textit{Notices} prior to the meeting in question. To achieve this, listings should be sent in Providence SIX MONTHS prior to the scheduled date of the meeting.

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Fall 1983. Special Semester in Hodge Theory: Valley Geometry Seminar, Amherst College, Amherst, Massachusetts; Mount Holyoke College, South Hadley, Massachusetts; Smith College, Northampton, Massachusetts; University of Massachusetts, Amherst, Massachusetts. (October 1983, p. 669)


June


JANUARY 1984


FEBRUARY 1984

5–9. Australian Applied Mathematics Conference, Merimbula, New South Wales, Australia. Information: Ashley Plank, AMC Conference Secretary, School of Information Sciences, Canberra College of Advanced Education, Box 1, Belconnen, ACT 2616, Australia.


14–16. Twelfth Annual ACM Computer Science Conference, Franklin Plaza Hotel, Philadelphia, Pennsylvania. Themes: The themes for each of the three days will be: "Factory of the Future", "Coping with Small Computers", and "Social and Ethical Implications of Computers". Invited Speakers: Speakers on the three themes include Karl Kemp (McDonnell-Douglas Automation), Ernest W. Kent (National Bureau of Standards), and Mark S. Fox (Carnegie-Mellon University); Lawrence Tesler (Apple Computer Corporation), James H. Morris (Carnegie-Mellon University), and Andries Van Dam (Brown University); and Daniel D. McCracken (City College of New York), Abbe Mowshowitz (Rensselaer Polytechnic Institute) and Rob Kling (University of California at Irvine).

Information and Registration: Frank Friedman, ACM Computer Science Conference Chairman, Computer and Information Science Department, Temple University, Philadelphia, Pennsylvania 19122, 215-787-1912.
Sponsor: ACM Special Interest Group on Computer Science Education.
Information: Richard H. Austing, Department of Computer Science, University of Maryland, College Park, Maryland 20742, 301-454-2004.

MARCH 1984

5–7. "%Math and Movies"—Mathematics and Audiovisual University of Torino, Italy.
Organizers: M. Emmer, R. Arzarello.
Information: R. Arzarello, Dipartimento di Matematica, Università di Torino, Via Principe Amedeo 8, 10123 Torino, Italy.

Invited Lecturers: Paul Erdös (Hungarian Academy of Sciences), William M. Kantor (University of Oregon), Paul Seymour (Massachusetts Institute of Technology), and Robert Tarjan (Bell Laboratories).
Call for Papers: There will be sessions for fifteen-minute presentations of contributed papers. Abstract deadline is February 20, 1984.
Information and Abstracts: K. B. Reid, Department of Mathematics, Louisiana State University, Baton Rouge, Louisiana 70803, 504-388-1665.

12–16. Seventeenth Annual Simulation Symposium, Bay Harbor Inn, Old Tampa Bay, Florida. (October 1983, p. 672)


Invited Lecturers: One-hour lectures will be given by P. Deligne, J. Isgus, R. Langlands, J. Millson, M. Moetow, Y. Siu, D. Sullivan, and R. Zimmer.
Information: Roger Howe, Department of Mathematics, Box 2155, Yale Station, New Haven, Connecticut 06520.

Information: Institut National de Recherche en Informatique et en Automatique, Domaine de Voluceau, Rocquencourt, B. P. 105 78153 Le Chesnay, Cedex, France.

APRIL 1984


Program: There will be lectures, exhibits, and workshops addressing several related questions, including geometry in scientific thought, the role of tactile and visual perception in learning mathematics, current research and unsolved problems in the theory of polyhedra, and implications for high school and college geometry curricula. There will also be four sessions on the following topics: model-building as hobby and profession; applications of polyhedra; theory of polyhedra; and unsolved problems.
Speakers: Speakers and workshop leaders will include: Peter Chieh, H. S. M. Coxeter, Douglas Dunham, Arthur Loeb, Joseph Malekowitch, Jean Pedersen, Doris Schattenschneider, Marion Walter, Magnus Wenninger, Walter Whiteley, Marjorie Senechal, George Flick, Lee Burns, and Robert Whorf.
Information: Marjorie Senechal, Clark Science Center, Smith College, Northampton, Massachusetts 01063.

9–13. British Mathematical Colloquium, University of Bristol, Bristol, United Kingdom. (November 1983, p. 799)


Principal Lecturer: H. T. Banks, Brown University and Southern Methodist University.
Program: Professor Banks will give five lectures covering the following topics: motivational examples and applications from the biological and engineering sciences; approximation schemes for delay systems: averaging, Walsh, spline, and spectral methods; approximation schemes for partial differential equations: spline, modal, and spectral methods; feedback control: numerical algorithms and results; and parameter estimation: numerical algorithms and results. A tentative list of invited speakers includes D. Aubley, J. A. Burns, E. M. Clift, P. L. Daniel, K. Itô, G. Rosen, D. Salamon, and M. Vogelius.


Program: There will be one or two hour-long expository lectures and 20-minute talks on current or proposed research. There will also be informal discussions.
Call for Papers: Title and a one- or two-sentence abstract should be sent to the address below by March 25, 1984.
Information: Charles Vandendyden, Department of Mathematics, Illinois State University, Normal, Illinois 61761.

17–19. Sixth Colloque International sur la Programmation, Toulouse, France. (October 1983, p. 672)


MAY 1984


2–4. Optimisation Days 1984, Concordia University, Montreal, Quebec, Canada. (November 1983, p. 799)

Program: The symposium will be dedicated to Professor John H. Argyris, and will aim at presenting and unifying recent advances in numerical methods in engineering.
Information: H. Kardestuncer, Chairman, Seventh UFEM Symposium, University of Connecticut, U-37, Storrs, Connecticut 06268.

4–6. Midwest Algebraic Geometry Conference, Purdue University, West Lafayette, Indiana. (October 1983, p. 672)


14-15. Sixth Symposium on Mathematical Programming with Data Perturbations, Marvin Center, George Washington University, Washington, D.C.

Call for Papers: Papers are solicited in the following areas: sensitivity and stability analysis results and their applications; solution methods for problems involving implicitly defined problem functions; solution methods for problems involving deterministic or stochastic parameter changes; solution approximation techniques and error analysis. Abstracts of about 500 words, avoiding mathematical symbols and references and including name and full mailing address of each author, should be sent in triplicate to the address below by March 16, 1984.


Information: Institut National de Recherche en Informatique et en Automatique, Domaine de Voluceau, Rocquencourt, B.P. 105 78153, Le Chesnay, Cedex, France.

17-18. IMACS International Symposium on Modelling and Simulation of Electrical Machines and Converters, Liege, Belgium. (October 1983, p. 672)


Invited Speaker: K. L. Chung.

Information: Yash Mittal, Department of Statistics, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061.


JUNE 1984


Topics: Topics covered will include mathematical software for optimisation, techniques for dealing with nonlinear constraints, and algorithms for finding global optima.


12-14. Tenth International Symposium on Machine Processing of Remotely Sensed Data, Purdue University, West Lafayette, Indiana. (October 1983, p. 673)


Speakers: F. Atkinson (Toronto), D. Colton (Delaware), G. Duff (Toronto), A. Laser (Coral Gables), W. Loud (Minneapolis), J. Mawhin (Belgium), M. Shubnik (Victoria), C. Swanson (Vancouver), H. Weinberger (Minneapolis).

Call for Papers: Abstracts for 20-minute papers must be received at the address below by June 1, 1984.


Sponsor: Canadian Mathematical Society.

Information: H. I. Freedman, Department of Mathematics, University of Alberta, Edmonton, Alberta, Canada.


Topics: Nonlinear evolution equations; variational and topological methods; applied numerical analysis.

Program: There will be survey lectures and talks on topics of current interest invited speakers. There will also be sessions for contributed papers and a session to discuss open problems and new directions.

Information and Abstracts: V. Lakshmikantham, Department of Mathematics, University of Texas at Arlington, Box 14908, Arlington, Texas 76019.


Information: Institut National de Recherche en Informatique et en Automatique, Domaine de Voluceau, Rocquencourt, B.P. 105 78153 Le Chesnay, Cedex, France.


Information: R. J. Jarvis, Department of Mathematical Sciences, The University, Dundee DD1 4HN, Scotland.


25-July 6. La Mécanique Non Linéaire, Bréau sans Nappe, France.

Information: Institut National de Recherche en Informatique et en Automatique, Domaine de Voluceau, Rocquencourt, B.P. 105 78153 Le Chesnay, Cedex, France.


Program: The conference is intended as a high-level introduction to some of the recent developments in the theory of Lie algebras (finite and infinite dimensional, characteristic zero and modular), their representations, associated combinatorial structures, formal Lie groups, and related topics. In addition to the invited talks, there will be sessions for the presentations of contributed papers.

Organizing Committee: D. Britten, F. Lemire (University of Windsor), R. Moody (CRMA Université de Montréal), M. Racine (Université d’Ottawa).

Information: Lie Algebra Conference, Department of Mathematics, University of Windsor, Windsor, Ontario, Canada, N8P 3A6, 519-253-4232.


Information: Institut National de Recherche en Informatique et en Automatique, Domaine de Voluceau, Rocquencourt, B.P. 105 78153, Le Chesnay, Cedex, France.

JULY 1984


Theme: Dynamics in Biology.

Topics: Transduction and adaptation (e.g. in vision and hearing), chemotaxis, neural dynamics, mechanical models of development, biocomputing; also the use of mathematical modelling in modern molecular genetics.

Invited Speakers: Leroy Hood (California Institute of Technology); Walter Goad (Los Alamos National Laboratory); Michael Zuker (National Research Council of Canada); Bruce Levin (University of Massachusetts); Sally Zigmond (University of Pennsylvania); Douglas Lauffenburger (University of Pennsylvania); Albert Goldbeter (University Libre de Bruxelles); Hans Othmer (University of Utah); Walter Heiligenberg (University of California at Los Angeles); Rudolfo Llinas (New York University Medical Center); Avis H. Cohen (Cornell University); Philip J. Holmes (Cornell University); Illani Atwater (University of East Anglia); John Rinsel (National Institutes of Health); John Campbell (University of California at Los Angeles); Stephen Wolfram (Institute for Advanced Study); J. D. Murray (University of Oxford); George F. Oster (University of California); Gary M. Odell (Rensselaer Polytechnic Institute); Mark Bietak (Los Alamos National Laboratory); Charles Peskin (Courant Institute); A. J. Hudspeth (University of California School of Medicine); Richard Skalak (Columbia University).

Information: Nancy Kopell, Department of Mathematics, Northeastern University, Boston, Massachusetts 02115, or Alan Perelson, Los Alamos National Laboratory, MS M710, Los Alamos, New Mexico 87545.


Information: L. Bican, Charles University, MFF, Sokolovská 83, 18600 Praha 8, Czechoslovakia.


Organizers: S. N. Gersten (University of Utah), John R. Stallings (University of California at Berkeley).

Invited Speakers: Roger Lyndon (University of Michigan), James Howie (University of Glasgow), G. P. Scott (University of Liverpool), B. Eckmann (E.T.H., Zurich), Andrew Casson (University of Texas), John Hempel (Rice University), and possibly one other speaker.

Support: A National Science Foundation grant has been applied for.

Information: S. N. Gersten, Department of Mathematics, University of Utah, Salt Lake City, Utah 84112, or John R. Stallings, Department of Mathematics, University of California at Berkeley, Berkeley, California 94120.


Topics: Classical applied mathematics; numerical analysis; scientific computing; applications (especially robotics, CAD/CAM, computational statistics).


16–27. Fifth International Conference on Probability in Banach Spaces, Tufts University, Medford, Massachusetts.

Program: The conference will emphasize current research as well as applications of probability in Banach space techniques to problems in statistics and analysis. There will be mini-courses on: Empirical Processes (R. M. Dudley, M.I.T.); Large Deviations (N. Jain, Minnesota); and Probabilistic Methods in Harmonic Analysis (G. Pisier, Paris).

Speakers: (Tentative): S. Berman (Courant Institute); L. LeCam (Berkeley); W. Johnson (Ohio State); P. Révész (Budapest); H. Rosenthal (University of Texas, Austin); and D. Stroock (University of Colorado).

Organizing Committee: A. Beck and J. Kuelbs (University of Wisconsin, Madison), R. M. Dudley (Massachusetts Institute of Technology), M. G. Hahn (Tufts University), and M. B. Marcus (Texas A&M University).

Information: Marjorie G. Hahn, Department of Mathematics, Tufts University, Medford, Massachusetts 02155, 617-629-5000, ext. 2068.

16–27. Seventh Latin American School of Mathematics, Universidad Simón Bolívar, Caracas, Venezuela.

Program: The School will be devoted to dynamical systems and geometrical aspects of partial differential equations. There will be invited talks, lecture series on advanced topics, and introductory courses on the following topics: bifurcation theory (J. Sotomayor); mechanics and symplectic geometry (L. Recht and E. Flachchart); Fourier integral operators (G. Mendoza); and geometry of the spectrum (C. Berenstein). Contributed papers are invited.


23–27. Conference on Complex Analysis and Approximation Theory, State University of Campinas, Campinas, São Paulo, Brazil. (November 1983, p. 800)

23–August 8. NATO-ASI Conference on Computational Mathematical Programming, Bad Windsheim, Federal Republic of Germany. (November 1983, p. 800)

23–August 10. Séminaire de Mathématiques Supérieures—NATO Advanced Study Institute (SMS-NATO ASI) on Universal Algebra and Relations, Université de Montréal, Montréal, Québec, Canada.

Sponsors: NATO Advanced Study Institutes Program; Ministry of Education of Quebec; Natural Sciences and Engineering Research Council of Canada; Université de Montréal.
Program: The lattice of clones in universal algebra and relations; theory of relations and relation algebras; and certain aspects of lattice theory. There will be introductory courses on the above subjects, followed by seminars on recent developments.

Principal Speakers: T. Evans (Emory); R. Fraïssé (Marseille); G. A. Grätzer (Manitoba); B. Jónsson (Vanderbilt); M. Pouzet (Lyon); R. W. Quackenbush (Manitoba); I. B. Rosenberg (Montréal); A. Szendrei (Szeged); R. Wille (Darmstadt).

Information: SMS-NATO ASI, Département de mathématiques et de statistique, Université de Montréal, C.P. 6128, Montréal H3C 3J7, Canada.


AUGUST 1984


SEPTEMBER 1984


Purpose: The purpose of the conference is to bring together a group of persons from a diverse background of disciplines, such as mathematics, mechanics, biomechanics, physics, biology, theoretical chemistry, industry, and economics; to summarize the state of the art and knowledge concerning nonlinear oscillations and to promote discussions of various theories and concepts.

1^a Boundedness of
d Fourier Integral Operators
R. Michael Beals

Classical zero order pseudodifferential operators are bounded on $L^p$ for $1 < p < \infty$, but for even the simplest Fourier integral operators (arising in the solution of the wave equation) this property may fail for $p \neq 2$. In this Memoir, the action of lower order Fourier integral operators on $L^p$ spaces is considered. Under certain assumptions on the matrix of second derivatives of the phase function, it is shown that such operators are bounded, with the range of $p$ depending on the order of the operator. That this range is essentially best possible is seen in the case of the wave equation. Applications are made to solutions of strictly hyperbolic partial differential equations.

Contents

1. Multipliers $e^{-ip(t)\xi}$
2. An oscillating integral on $\mathbb{R}$
3. An oscillating integral on $\mathbb{R}^n$
4. Fourier integral operators
5. Applications to strongly hyperbolic equations

Bibliography

1980 Mathematics Subject Classifications. 42B20, 47G05
Memoirs of the American Mathematical Society
Memoir Number 264, viii + 60 pages (soft cover)
List price $15, institutional member $16,
individual member $4
ISBN 0-8218-2264-0; LC 82-8754
Publication date: July 1982
To order, please specify MEMO/264N

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REFERENCE WORKS

Mathematical Sciences Professional Directory
(previously Mathematical Sciences Administrative Directory)

This directory, published annually, lists key personnel—officers and committee members—of over thirty professional mathematical organizations and of a selected group of government agencies, editors of over 100 journals, over 3,000 heads of academic departments in the mathematical sciences, and heads of mathematical units in nonacademic organizations. Information includes current addresses (including telephone numbers in many cases), terms of office, and other pertinent information for the organizations represented.

Mathematical Sciences Professional Directory
1984 Volume, about 112 pages (soft cover)
Price $14
ISBN 0-8218-0064-7
Publication date: February 1984
To order, please specify ADMDIR/84N

Alphabetical Subject Index of Mathematical Reviews,
1940—58 (Volumes 1—19)
J. L. Selfridge, Editor

With the publication of the 1973–1979 author and subject indexes to Mathematical Reviews, the desirability of subject indexing for the earlier years of MR became clear. Prior to 1959 an alphabetical subject index was published each year.

We are pleased to announce that we have combined these yearly subject indexes into a single volume.

Most of the main alphabetical headings from the original indexes were kept and all the subheadings have been alphabetized under each main heading. The original cross-references have been augmented by cross-references from each major word in any main heading or subheading. The two MR volume number and year are listed above each list of the author names and page numbers.

CONTEMPORARY MATHEMATICS
(ISSN 0271-4132)

Value Distribution Theory and Its Applications
Chung-Chun Yang, Editor

In April of 1983 a special session on value distribution theory and its applications was held in New York City as part of the 803rd meeting of the AMS. The purpose of this session was to bring together some of the mathematicians working in this active field, to present the results of their research, to explore and exchange problems among themselves, and to stimulate further research in this area.

Recently there have appeared numerous articles on the beautiful and classical Nevanlinna value distribution theory and its applications. This book contains many generalizations, new approaches, new techniques, and new conjectures for some old and well-known results relating to value distribution theory. More specifically, it covers topics in general theory on growth estimation of entire solutions of algebraic differential equations, entire functions of
bounded index, distributions of zeros of meromorphic functions, factorization theory, defect relations for small functions (in one variable and several variables), and holomorphic curves.

Contributors to this Volume
Chi-Tai Chuang, Peking University, China
Mats R. Essén, University of Uppsala, Sweden
Albert Edrei, Syracuse University
Fred Gross, University of Maryland, Baltimore County, and Naval Research Laboratory
Yong-Xing Gu, Nan-Chun Normal College, China
Yu-Zan He, Institute of Mathematics, Academia Sinica, Beijing, China
Simon Hellerstein, University of Wisconsin, Madison
Jun-Shung Hwang, Institute of Mathematics, Academia Sinica, Taiwan
James K. Langley, University of Illinois, Urbana-Champaign
Peter A. Lappan, Michigan State University
Lennox S. O. Liverpool, Jos University, Nigeria
Seiki Mori, Yamagata University, Yamagata, Japan
Kiyoshi Niino, Kanazawa University, Japan
Charles F. Osgood, Naval Research Laboratory
John Rossi, Virginia Polytechnic Institute, and State University
Ranjan Roy, Beloit College
S. M. Shah, University of Kentucky
Daniel F. Shea, University of Wisconsin, Madison
Li-Chien Shen, California Institute of Technology
Leonard M. Smiley, University of Alaska
Guo-Dong Song, Cornell University
Charles S. Stanton, University of North Carolina
Shlomo Sternitz, University of Haifa, Israel
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Sakari Toppila, University of Helsinki, Finland
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Jack Williamson, University of Hawaii
Xiu Zhi Xiao, Wuhan University, China
Nino Yanagihara, Chiba University, Japan
Chung-Chun Yang, Naval Research Laboratory
Kenneth B. Yugueta, University of Jos, Nigeria

1980 Mathematics Subject Classifications: 30D30, 30D35, 32A22

Contemporary Mathematics
Vol. 25, x + 253 pages (soft cover)
List price $28, institutional member $21, individual member $14
ISBN 0-8218-5025-3; LC 83-21465
Publication date: January 1984
To order, please specify CONM/25N

ERRATUM
In the October issue of Notices, in the New Publications section, two titles contained errors. On page 676 the correct title is Factorizations of $b^n \pm 1$, $b = 2, 3, 5, 6, 7, 10, 11, 12$ up to High Powers. On page 677, the correct title is Chapter 9 of Ramamujan's Second Notebook: Infinite Series Identities, Transformations, and Evaluations.

RECENT REPRINTS
DYNAMICAL SYSTEMS
by G. D. Birkhoff
Colloquium Publications, Volume 9
313 pages (ISBN 0-8218-1009-X) (soft cover)
1927; revised 1966, reprinted 1983
List price $26, institutional member $20, individual member $13
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GLOBAL ANALYSIS, PART III
edited by S. S. Chern and S. Smale
Proceedings of Symposia in Pure Mathematics
1970; reprinted 1983 (soft cover)
List price $31, institutional member $23, individual member $16
To order, please specify PSPUM/16N

SPECIAL FUNCTIONS AND THE THEORY OF GROUP REPRESENTATIONS
N. Ja. Vilenkin
translated by V. N. Singh
Translations of Mathematical Monographs
Volume 22, 613 pages (ISBN 0-8218-1572-5)
1968; reprinted 1983 (soft cover)
List price $50, institutional member $38, individual member $25
To order, please specify MMONO/22N

DIFFERENTIAL GEOMETRY
edited by C. B. Allendoerfer
Proceedings of Symposia in Pure Mathematics
1961; reprinted 1983 (soft cover)
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Personal Items

F. Rudolf Beyl of the University of Oldenberg, Federal Republic of Germany, has been appointed to an assistant professorship at Portland State University.

Frank P. Engel of Daniel H. Wagner, Associates has been promoted to Vice President.

David C. Kay of the University of Oklahoma has been appointed professor of mathematics and chairman of that department at the University of North Carolina, Asheville.

Eugene M. Luks of the University of Oregon has been appointed professor and head of the Department of Computer and Information Science at that university.

Blaise G. Morton of Dartmouth College has joined the Paoli Office of Daniel H. Wagner, Associates.

George D. Mostow, Henry Ford II Professor of Mathematics at Yale University, has been elected to the Board of Trustees of the Institute for Advanced Study.

Mark A. O’Donnell of the University of California, Davis has joined the Yorktown Office of Daniel H. Wagner, Associates.

Henry B. Potocsky of the Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio has been appointed to a professorship at that institution.

Walter R. Stromquist of the Paoli Office of Daniel H. Wagner, Associates has been promoted to Senior Associate.

Ellen M. Torrance, a Fellow of the Society of Actuaries since November 1982, formerly with the New York Life Insurance Company is now a free-lance consultant.

Deaths

Edmund H. Feller of the University of Wisconsin, Milwaukee, died on June 17, 1983 at the age of 59. He was a member of the Society for 31 years.

Makoto Itoh of Hiroshima, Japan, died on January 7, 1983 at the age of 81. He was a member of the Society for 21 years.

Szolem Mandelbrojt of the Collège de France in Paris, died on September 23, 1983 at the age of 83. He was a member of the Society for 42 years.

Leonard Procita of Albany, New York, died on March 25, 1983 at the age of 63. He was a member of the Society for 21 years.

Visiting Mathematicians
(Supplementary List)

Mathematicians visiting other institutions during the 1983-1984 academic year have been listed in recent issues of the Notices: June 1983, pages 450–452; August 1983, pages 550–552; October 1983, pages 658–668; and November 1983, page 804. The list below gives the name and home country, the host institution, period of visit, and field of special interest of additional visiting mathematicians.

Vieri Benci (Italy), University of Wisconsin, Madison, August 1983 to May 1984, applied analysis.

P. B. Bhattacharya (India), Ohio University, Athens, September 1983 to April 1984, abstract algebra.

S. R. Nagpaul (India), Ohio University, Athens, September 1983 to April 1984, abstract algebra, applied algebra.

Mamoru Nunokawa (Japan), University of Mississippi, October 1983 to July 1984, complex analysis.

Lee N. Rudolph (U.S.A.), University of Geneva, Switzerland, October 1983 to July 1984, braids; topology of complex surfaces.

Devendra Prasad Shukla (India), University of Wisconsin, Madison, January 1984 to December 1984, analysis, algebra.

Michael Stob (U.S.A.), University of Wisconsin, Madison, August 1983 to May 1984, mathematical logic.

Rastislav Telgarsky (Poland), Virginia Polytechnic Institute and State University, September 1983 to August 1984, topology, game theory.
Erratum to the 1983-1984 Combined Membership List

In the Alphabetic Listing of Individual Members section of the 1983-1984 Combined Membership List, the members who are affiliated with Brooklyn College (CUNY) were incorrectly listed as being affiliated with Brooklyn Center of Long Island University. The corrected listings are given below. The AMS staff offers its apologies for any inconvenience this error may have caused.

ALPHABETIC LISTING OF INDIVIDUAL MEMBERS

IF NO DEPARTMENT IS SPECIFIED WITH ACADEMIC MAILING ADDRESS, DEPARTMENT OF MATHEMATICS IS TO BE ASSUMED
Recent Appointments

| Committee members' terms of office on standing committees expire on December 31 of the year given in parentheses following their names, unless otherwise specified. |

Raymond G. Ayoub and W. Dale Brownawell were appointed by President Julia B. Robinson to be the tellers in the election of 1983.

Richard E. Ewing (1986) has been appointed by President Julia B. Robinson to the Proceedings of Symposia in Applied Mathematics Committee. Continuing members of the committee are William A. Massey (1985) and Lloyd R. Welch, chairman (1984).

Kenneth J. Barwise (1986) and William P. Ziemer (1986) have been appointed to the Program Committee for National Meetings by President Julia B. Robinson. Continuing members of the committee are Robion C. Kirby (1984), Barry Mazur (1985) Everett Pitcher (ex officio), Karen Uhlenbeck (1985), and Melvin Hochster (1984) who has been reappointed chairman.

President Julia B. Robinson has appointed Eric D. Bedford (1985) and Bhama Srinivasan (1985) to the Committee to Select Hour Speakers for Central Sectional Meetings. Continuing members of the committee are Robert M. Fossum (ex officio), Israel N. Herstein (1984), and William B. Johnson (1984) who has been appointed chairman.

George R. Kempf (1985) and Floyd L. Williams (1985) have been appointed by President Julia B. Robinson to the Committee to Select Hour Speakers for Eastern Sectional Meetings. Continuing members of the committee are W. Wistar Comfort (ex officio), Yum Tong Siu (1984), and Richard P. Stanley (1984) who has been appointed chairman.

Irving L. Glicksberg (1985) and Masamichi Takesaki (1985) have been appointed to the Committee to Select Hour Speakers for Far Western Sectional Meetings by President Julia B. Robinson. Paul J. Cohen (1984) has been reappointed chairman. Other members of the committee are Tsit-Yuen Lam (1984) and Hugo Rossi (ex officio).

Leonard L. Scott, Jr., (1985) has been appointed by President Julia B. Robinson to the Committee to Select Hour Speakers for Southeastern Sectional Meetings. Continuing members of the committee are A. T. Bharucha-Reid (1984), Frank T. Birtel (ex officio), and Carl Pomerance (1984) who has been appointed chairman.

Marian B. Pour-El, Jim Douglas, Jr., and Samuel Karlin have been appointed by President Julia B. Robinson to the Committee to Select the Gibbs Lecturers for 1985 and 1986. Professor Pour-El will serve as chairman.


Stefan A. Burr (1986) and Gerald J. Janusz (1986) have been appointed by President Julia B. Robinson to the Committee on Employment and Educational Policy. Continuing members of the committee are Lida K. Barrett (1985), Lisl Novak Gaal (1985), Irwin Kra (1984), and Donald C. Rung (1984) who has been reappointed chairman.

Lenore Blum (1986) and Joshua A. Leslie (1986) have been appointed to the Committee on Human Rights of Mathematicians by President Julia B. Robinson, and Chandler Davis (1986) has been reappointed to the committee and as chairman. Other members of the committee are Leon A. Henkin (1985), Peter J. Hilton (1984), John Nobel (1985), and Eduardo D. Sontag (1984).

Ralph P. Boas (1985) and Gail S. Young, Jr., (1985) have been appointed by President Julia B. Robinson to the Committee on Prizes. The other member of the committee is Dorothy M. Stone (1984) who has been appointed chairman.

President Julia B. Robinson has appointed Michael Aschbacher, Melvin Hochster and Bhama Srinivasan to the Committee to Select the Winner of the Cole Prize for 1985. Professor Aschbacher will serve as chairman.

Hui-Hsiung Kuo (1986) and Judith D. Sally (1986) have been appointed to the Committee on Summer Institutes by President Julia B. Robinson. Continuing members of the committee are Michael Artin (1985), Thomas H. Brylawski (1985), Robert Osseman, chairman (1984), and Harold M. Stark (1984). Terms expire on February 28.

Johan H. B. Kemperman (IMS) and David A. Sanchez (AMS) have been appointed to the AMS-IMS-SIAM Ad Hoc Oversight Committee of the Evaluation Panel for NSF Postdoctoral Fellowships in the Mathematical Sciences. The other member of the committee is Mark Ablowitz (SIAM). Professor Kemperman will serve as chairman.

A new AMS-MAA-SIAM Joint Committee on the Status of the Profession has been appointed by Presidents Julia B. Robinson (AMS), Ivan Niven (MAA) and Hirsch G. Cohen (SIAM). The members of the committee are Lida K. Barrett (MAA), Wendell H. Fleming (SIAM), Murray Gerstenhaber (AMS), Louise Hay (AMS), Irwin Kra, member-at-large, Bernard L. Madison (MAA), and Robert McKelvey (SIAM).
Reports of Past Meetings

1983 Summer Research Institute
Nonlinear Functional Analysis and Applications

The American Mathematical Society held its thirty-first Summer Research Institute at the University of California, Berkeley, from July 11 to July 29, 1983. The institute was partially supported by a grant from the National Science Foundation.

The purpose of the institute was to present and develop worldwide research in nonlinear functional analysis and its applications, especially in the study of boundary value problems for nonlinear partial differential equations and corresponding problems in geometry and mathematical physics. Major topics which were covered include: Minimax methods in the calculus of variations, existence theory for variational problems without compactness, theories of degree of mapping, inverse function theorems of Nash-Moser type, nonlinear semigroup theory, nonlinear equations of evolution, nonlinear problems of control theory, periodic solutions of Hamiltonian systems, generalizations of the Morse theory, nonlinear equations in gauge field theory, the theory of Feigenbaum cascades, the study of the Navier-Stokes equations, nonlinear problems in differential geometry, and a variety of topics concerning nonlinear elliptic boundary value and eigenvalue problems, bifurcation theory, nonlinear hyperbolic equations, nonlinear conservation laws, nonlinear Hamilton-Jacobi equations, and an even wider variety of physical applications.

There were 13 series of expository lectures totaling 39 hours of lectures which summarized main directions of current research. In addition there were 115 one-hour talks.

A total of 203 mathematicians registered for the institute, twenty of whom were students. Twenty-one participants were accompanied by one or more members of their families for at least part of the time. Twenty-two countries not in North America were represented by the following numbers of participants: Africa (1), Argentina (1), Australia (3), Belgium (1), Brazil (1), China (4), Czechoslovakia (1), England (4), France (22), Israel (2), Italy (14), Japan (8), Korea (1), Netherlands (2), New Zealand (1), Poland (1), Rumania (1), Scotland (1), Spain (4), Sweden (2), Switzerland (3), and West Germany (12).

As with previous summer research institutes, the Society will publish formal proceedings in the series Proceedings of Symposia in Pure Mathematics, which will include papers by most of the hour speakers.

The topic of this institute was selected by the AMS Committee on Summer Institutes, whose members at the time were Morris W. Hirsch, Robert Osserman (chairman), George C. Papanicolaou, Wilfried Schmid, Harold Stark, and Stephen Wainger.

The Organizing Committee for the institute included Haim Brezis, Felix Browder (chairman), Tosio Kato, J.-L. Lions, Louis Nirenberg, and Paul Rabinowitz.

The October Meeting in Fairfield

The eight hundred and sixth meeting of the American Mathematical Society took place at Fairfield University in Fairfield, Connecticut, on Friday and Saturday, October 28 and 29, 1983. There were 169 registrants, including 150 members of the Society.

Invited Addresses. By invitation of the Committee to Select Hour Speakers for Eastern Sectional Meetings, there were three invited one-hour addresses. The names of the speakers, their affiliations, and the titles of their talks, are as follows:

JOHN L. HARER, Columbia University and University of Maryland, College Park, Homology of the moduli space of curves.

JOHN HUBBARD, Cornell University and Harvard University, Dynamics of rational maps.

DANIEL J. KLEITMAN, Massachusetts Institute of Technology, Dependent intervals.

The three speakers were introduced by William Abikoff, Lisa Goldberg, and Richard Stanley, respectively.

Special Sessions. By invitation of the same committee, there were five special sessions of selected twenty-minute papers. The topics of these special sessions, the names and affiliations of the mathematicians arranging them, and the lists of speakers, are as follows.

Theory of infinite groups, BEN FINE, Fairfield University. The speakers were Robert Bieri, Richard Goldstein, Roger Lyndon, John Ratcliffe, Dennis Spellman, Carol Tretkoff, Marvin Tretkoff, Peter Waterman, and Kenneth Weston.

Surfaces and three-manifolds, WILLIAM GOLDMAN, Massachusetts Institute of Technology and University of Maryland, and JOHN L. HARER. The speakers were William Abikoff, Robert Brooks, Ruth Charney, Tim D. Cochran, David Gabai, Jane Gilman, William Goldman, Matthew Grayson, Linda Keen, Irwin Kra, Larry Lok, Howard Masur, John McCarthy, Edward Miller, Lee Mosher, Patricia Sipe, and Scott Wolpert.


Approximation theory and numerical analysis, JOHN A. ROULIER, University of Connecticut. The speakers were M. Brannigan, R. P. Gosselin, Myron Henry, András Kroó, James Lewis, D. F. McAllister, Harry W. McLaughlin, Dennis Pence, T. J. Rivlin,
John A. Roulter, Oved Shisha, Roy L. Streit, and Dean Zwick.

Topics in complex analysis, DoroThy B. Shaffer, Fairfield University. The speakers were Roger Barnard, Louis Brickman, Bettye Anne Case, Peter Duren, Paul Gauthier, Walter Hengartner, Y. J. Leung, T. H. MacGregor, Peter McCoy, E. P. Merkes, David Minda, George Piranian, J. R. Quine, Glenn Schober, Herb Silverman, Evelyn Silvia, Ted J. Suffridge, and Anna Tsao.

Contributed Papers. There were, in addition, two sessions for contributed papers: one in Geometry and Topology chaired jointly by Dominu Eberle and Lorenzo Traldi, and one General Session chaired jointly by Samuel Zaidman and Gary Gordon.

Social Event. The Local Arrangements Committee organized a beer party on Friday evening.

Committee. The Local Arrangements Committee consisted of Jenny Baglivo, Robert Bolger, Joseph Dennin, Benjamin Fine, George Lang, Joseph MacDonnell (co-chair), Edward O'Neill, Dorothy Shaffer (co-chair), and Maurice Wong.

Middletown, Connecticut W. Wistar Comfort
Associate Secretary
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Qualifications include master's degree in Computer Science or Ph.D. in Mathematical Science with a strong background in Computing, capacity for research, and a dedication to undergraduate teaching. Salary negotiable. Liberal benefits include possible resources for assistants to pursue advanced Computer Science degrees. The Citadel is a state-supported, liberal arts, military college offering undergraduate degrees in the arts, sciences, engineering, education, and business administration.

Please send resume which includes the names of three references to:

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Charles E. Cleaver, Head, Department of Mathematics
Georgetown University
Washington, D.C. 20057

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AND COMPUTER SCIENCE
CALIFORNIA STATE UNIVERSITY
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Assistant or Associate Professor, tenure-track position. Ph.D. in Mathematics or Ph.D. in Computer Science with a background in Mathematics required. Strong computer science background desirable. Starting date: September 1984.

Salary: $21080–$30560. Evaluation of applicants will begin February 1, 1984. Send inquiries to Wayne Bishop, Chair, at the above address.

An Equal Opportunity, Affirmative-Action, Handicapped Title IX Employer.

CLEMSON UNIVERSITY
DEPARTMENT OF MATHEMATICAL SCIENCES

The Clemson University Department of Mathematical Sciences has at least three approved faculty positions beginning Fall Semester 1984.

SENIOR POSITION (Full Professor)

The Department seeks a senior mathematical scientist with specialization in one of three areas: APPLIED ANALYSIS/COMPUTATIONAL MATHEMATICS, DISCRETE MATHEMATICS/OPERATIONS RESEARCH, OR STATISTICS. Interest in the computational aspects of the area is desirable as are research interests in the applications of the mathematical sciences to the solutions of real-world problems. The salary is competitive and commensurate with experience.

ASSISTANT PROFESSORSHIPS

Each of at least two assistant professorships will be filled by a mathematical scientist possessing the Ph.D. degree with emphasis in one of the three areas: APPLIED ANALYSIS/COMPUTATIONAL MATHEMATICS, DISCRETE MATHEMATICS/OPERATIONS RESEARCH, OR STATISTICS. The completion of all requirements for the Ph.D. degree prior to August 15, 1984, may be substituted for the awarded Ph.D. degree. Strength in the computational aspects of the area is highly desirable as are research interests in the applications of the mathematical sciences to the solutions of real-world problems. All approved positions will be nine-month, tenure-track positions and salaries will be competitive.

The Department of Mathematical Sciences at Clemson University embraces algebra/combinatorics, analysis, computational mathematics, operations research and statistics and integrates these mathematical sciences into its B.A., B.S., M.S., and Ph.D. programs. Applications will be accepted until all approved positions are filled. Vita (with names and telephone numbers of three references), nominations, and requests for further information should be sent to: Dr. John D. Fulton, Head, Department of Mathematical Sciences, Clemson University, Clemson, S.C. 29631.

CLEMSON UNIVERSITY IS AN AFFIRMATIVE ACTION/EQUAL OPPORTUNITY EMPLOYER.

MIAMI UNIVERSITY anticipates at least two tenure-track assistant professorships in the Mathematics and Statistics Department beginning August 1984. Candidates should have a Ph.D. in mathematics, statistics or operations research and a genuine interest in teaching and scholarship. Duties include teaching an average of 8 to 9 classroom hours per week, continuing research, and departmental service. For one position, preference will be given to applicants in operations research. The second position will be unrestricted. Candidates should send vita, graduate transcripts and three letters of recommendation to Professor Fred Gass, Mathematics and Statistics Department, Miami University, Oxford, Ohio 45056 by February 1. (Late applications may be considered.) AA/EOE.
SYRACUSE UNIVERSITY
Department of Mathematics

Applications are invited for several tenure-track renewable positions effective 1 September 1984. Strong research potential is of primary importance, teaching ability is essential, and the Ph.D. is required. Preferred research areas include statistics, numerical analysis, and any of the specialties within the broad area of analysis; other areas compatible with the research activity in the department will be considered. Candidates should send a detailed vita, and arrange to have three letters of reference and a transcript sent to Professor L. J. Lardy, Chairman, Department of Mathematics, Syracuse University, Syracuse, New York 13210. Syracuse University is an affirmative action equal opportunity employer.

UNIVERSITY OF SOUTH ALABAMA
Department of Mathematics and Statistics

Applications are being accepted for at least two tenure-track positions at the rank of Assistant Professor. A successful applicant must possess a Ph.D. in Mathematics. Preferred specialties include differential equations, dynamical systems, ergodic theory, functional analysis, geometric topology, information theory, number theory, and numerical analysis. The duties of these positions include teaching undergraduate and graduate mathematics courses, carrying out research or other creative activity, and contributing to a scholarly atmosphere. The appointment will begin September 1984. Applications should be sent to a detailed résumé, transcripts, and three letters of recommendation to Dr. S. Gene Crossley, Chairman, Department of Mathematics and Statistics, University of South Alabama, Mobile, AL 36688. The closing date is February 1, 1984, USA is an equal opportunity/affirmative action employer.

UNIVERSITY OF CALIFORNIA, SANTA BARBARA
DEPARTMENT OF MATHEMATICS

The University of California at Santa Barbara Mathematics Department anticipates making several temporary, part-time or full-time, teaching appointments during the 1984-1985 academic year. We anticipate both part-time visiting faculty positions and full-time visiting lecturerships at a junior level (with possibility of renewal up to a maximum of 2 years). Applicants should be active research mathematicians or statisticians with certifiable good teaching skills. We encourage applicants in all research areas. Please send vita, publications list, letters of recommendation on teaching and research, and financial requirements by February 15, 1984 to: Professor James B. Robertson, Chair Mathematics Department University of California Santa Barbara, CA 93106. An Affirmative Action/Equal Opportunity Employer.

UNIVERSITY OF FLORIDA
DEPARTMENT OF MATHEMATICS

Applications are invited for several tenure-track positions at the Assistant or Associate professor level, beginning August 1984. Ph.D. degree with strong research potential or experience and dedication to teaching at undergraduate level required. Preferred research areas include analysis, applied mathematics in the broad sense. Candidates should send a detailed résumé, and arrange to have at least three letters of recommendation and a transcript sent to: Lokenath Debarnath, Chairman, Department of Mathematics, University of Central Florida, Orlando, FL 32816, not later than February 1, 1984. The University is an equal opportunity/affirmative action employer.

THE UNIVERSITY OF FLORIDA
ANNOUNCEMENT OF VACANCY
DEPARTMENT OF MATHEMATICS

Applications are invited for a full professorship/senior associate professorship available August 1984. This position requires a record of substantial research accomplishment and teaching experience. Outstanding candidates in all areas of mathematics will be given serious consideration. Departmental preferred research specialties include: partial differential equations, numerical analysis, theoretical computer science, combinatorics, and related areas. The academic year salary for this position is highly competitive.

Applications should provide a résumé, a list of publications, selected papers, and should arrange for five letters of reference to be sent to: Chairman, Senior Search and Screen Committee Department of Mathematics University of Florida Gainesville, Florida 32611. Application deadline is January 10, 1984. The committee urges early application.

TEXAS A&M UNIVERSITY
DEPARTMENT OF MATHEMATICS

Applications are invited for several tenure-track openings. All areas and ranks are considered. The Department has active research groups in Algebra, Approximation Theory, Functional Analysis, Geometry and Non-Linear Analysis, Number Theory and Partial Differential Equations and Combinatorics, Applied Mathematics, Probability and Topology. Interested individuals should send a vita and arrange for letters (if appropriate) to be sent to: Dr. H. E. Lacey, Head Department of Mathematics Texas A&M University College Station, Texas 77843. Equal Opportunity through Affirmative Action.

TEXAS A&M UNIVERSITY
DEPARTMENT OF MATHEMATICS

Texas A&M University and the Department of Mathematics invites applicants for the OWEN CHAIR in Mathematics. This is an endowed chair established by the gift of George Arthur and Mary Emolene Owen. The successful candidate must have a distinguished research record and considerable stature in the international mathematical community. The position is open to all areas of Mathematics. The Department has active research groups in Algebra, Approximation Theory, Functional Analysis, Geometry and Non-Linear Analysis, Number Theory and Combinatorics, Partial Differential Equations and Applied Mathematics, Probability and Topology. Interested individuals should contact: Dr. H. E. Lacey, Head Department of Mathematics Texas A&M University College Station, Texas 77843. Equal Opportunity through Affirmative Action.
SOUTHWEST TEXAS STATE UNIVERSITY

One or more non-tenure-track instructorships expected for fall 1984. Master's degree in mathematics or computer science and potential for excellence in teaching required. Contact Dr. John Spellmann, Chairman, Department of Mathematics/Computer Science, Southwest Texas State University, San Marcos, TX 78666. Application deadline 2/1/84. Late applications considered if openings exist. SWTSU is an EO/AA employer.

STATE UNIVERSITY OF NEW YORK
AT BINGHAMTON

The Department of Mathematical Sciences expects to have tenure-track-junior positions open in fall 1984. A senior appointment is also a possibility. Applications are invited from candidates having excellent research records or potential. All areas of pure and applied mathematics, including computer science, will be considered. The department has considerable computer science responsibilities, so applicants with CS experience, at whatever level, are asked to describe it. Send vita and letters of recommendation to: David L. Hanson, Chairman, Department of Mathematical Sciences, State University of New York at Binghamton, Binghamton, NY 13901.

An Equal Opportunity/Affirmative Action Employer

UNIVERSITY OF NORTHERN IOWA: MATHEMATICS POSITION

Tenure track position in mathematics at Assistant/Associate Professor level tentatively available. Salary and benefits competitive. Area of speciality is open, with preference for algebra or analysis (broadly defined). Doctorate in mathematical speciality, demonstrated teaching ability, and scholarly productivity and promise required. Closing date of March 20, or later if position is still open. For complete announcement, contact Dr. David Duncan, Head, Department of Mathematics and Computer Science, University of Northern Iowa, Cedar Falls, IA 50614. An equal opportunity/affirmative action employer.

ACTUARIAL SCIENCE permanent position-tenure track.

Teach actuarial and mathematics courses, advise students, aid in administration of undergraduate actuarial programs, engage in research or other scholarly activities. Either a Ph.D. or Fellowship in an Actuarial Society and some teaching experience preferred. Should have the ability and desire to energetically build up an existing actuarial program. Commitment to scholarship. Salary negotiable. Screening begins February 15, 1984. Contact: C. Vinsonhaler, Mathematics Department, The University of Connecticut, Storrs, CT 06268. THE UNIVERSITY OF CONNECTICUT IS AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER.

EMORY UNIVERSITY
DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

Tenure-track assistant or (junior) associate professor in analysis, numerical analysis or computer science, beginning August 1984. Strong research commitment is required.

EMORY UNIVERSITY, located in suburban Atlanta, is enlarging the faculty of the Department of Mathematics and Computer Science in response to the growth of both the graduate and undergraduate programs. The teaching environment (small classes, able students, no remedial programs) is unusually good. All applications should include a vita, a publication list, and at least three letters of reference. These should be submitted to: Paul Waltman, Chairman, Department of Mathematics and Computer Science, Emory University, Atlanta, GA 30322.

Applications will be reviewed beginning February 1, 1984. EMORY UNIVERSITY is an affirmative action/equal opportunity employer. Applications from members of minority groups and women are particularly encouraged.

EMORY UNIVERSITY
DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

Senior position in analysis, professor or associate professor, beginning August 1984. Established research record, proven ability to work with graduate students and a willingness to play a major role in the development of a quality graduate program are required. Preferred areas are differential equations, numerical analysis or applied mathematics. All applications should include a vita, a publication list, and the names of at least three references. Submit to: Paul Waltman, Chairman, Department of Mathematics and Computer Science, Emory University, Atlanta, GA 30322.

Applications will be reviewed beginning January 1, 1984. EMORY UNIVERSITY is an affirmative action/equal opportunity employer. Applications from members of minority groups and women are particularly encouraged.

DEPARTMENT OF MATHEMATICS
KANSAS STATE UNIVERSITY

Tenure-track position at the Assistant Professor level for the academic year 1984–1985. Salary commensurate with ability. Candidates must have demonstrated research ability in global analysis and the use of differential geometry and topology for the study of problems in analysis or theoretical physics. Commitment to excellence in teaching is expected. A Ph.D. in mathematics or equivalent required. Starting date: August 13, 1984; Closing date: January 31, 1984. Contact: Department Head, Department of Mathematics, Kansas State University, Manhattan, KS 66506; (913) 532-6750. KSU is an AA/EOE.

Tenure-track position at the Assistant Professor level for the academic year 1984–1985. Salary commensurate with ability. Candidates must have demonstrated research ability in number theory. Some areas of particular interest are the application of dynamical systems to number theory and sequences of integers. A broad background in algebraic number theory is also desirable. Commitment to excellence in teaching is expected. A Ph.D. in mathematics or equivalent required. Starting date: August 13, 1984; Closing date: January 31, 1984. Contact: Department Head, Department of Mathematics, Kansas State University, Manhattan, KS 66506; (913) 532-6750. KSU is an AA/EOE.
POSITIONS AVAILABLE

UNIVERSITY OF WISCONSIN-PLATTEVILLE

Position Title: Academic Staff or Probationary Faculty, Lecturer or Assistant Professor.

Position Description: Teach undergraduate college mathematics courses; primarily freshman and sophomore courses.

Salary: $18,000—$24,000+ depending upon qualifications and experience.

Qualifications Required: Minimum: Masters Degree; Ph.D. preferred and required for tenure-track position.

Effective Date of Appointment: August 22, 1984.

Application: Send resume and three reference letters to: F. Dawson Trine, Chairman, Department of Mathematics, UW-Platteville, Platteville, WI 53818. Deadline: March 1, 1984

An Affirmative Action — Equal Opportunity Employer

SYSTEMS SCIENCE/MATHEMATICS

Washington University, Department of Systems Science and Mathematics, has an opening for a Visiting Assistant Professor for the academic year 1984/85. Conversion to Assistant Professor on the tenure track is possible. D. Sc. or Ph.D. from a renowned university is required. Applicant must be an expert in systems theory, including the theory of stability and robustness of multivariable systems. Applicants must be well versed in algebraic, geometric and topological techniques of control and systems theory.

Reply with résumé and other evidence of qualifications to: Dr. John Zaborszky, Chairman, Department of Systems Science and Mathematics, Washington University, Campus Box 1040, St. Louis, MO 63130.

An Equal Opportunity Employer.

ROCHESTER INSTITUTE OF TECHNOLOGY

DEPARTMENT OF MATHEMATICS

ROCHESTER, NY 14623

Anticipated Asst./Asso. Professor positions for Sept. 1984. Ph.D. and/or extensive experience in mathematics, preferably with concentration in at least one area within applied mathematics, graph theory, numerical analysis, operations research or statistics. Applicants must have a strong interest in teaching at the undergraduate level, as well as working with others in applied research areas.

CONTACT: Dr. George T. Georgantas, Head

RIT: Affirmative Action/Equal Opportunity Employer


UNIVERSITY OF WISCONSIN—Madison

Van Vleck Assistant Professorships in Mathematics. We invite applications from outstanding mathematicians (of any age) who are recent recipients of a doctorate—people who will interact well with members of our department, who care about teaching, and who can contribute to our research and instructional programs. Teaching load is 2 courses per semester. High probability of additional income through research or teaching during summers between consecutive years of appointment. Salary dependent on experience—at least $22,500 per academic year. Two- or three-year term positions. Deadline for applications is December 31, 1983. Write J. Marshall Osborn, Chairman, Department of Mathematics, 223 Van Vleck Hall, University of Wisconsin, 480 Lincoln Drive, Madison, Wisconsin 53706. The University of Wisconsin—Madison is an Equal Opportunity Employer.

THE UNIVERSITY OF PITTSBURGH

PITTSBURGH, PENNSYLVANIA 15260

Applications invited for 2 junior-level tenure-track faculty positions anticipated in 1984. Preferred areas: PDE's, analysis, applied mathematics. Present teaching loads: 2 classes per term, 2-term 8-month academic year. Ph.D., publications, effective teaching ability required. C.V., 4 letters of recommendation, reprints, preprints should be sent to W. E. Deskins, Chairman, Department of Mathematics and Statistics, University of Pittsburgh, Pittsburgh, Pennsylvania 15260. U.P. is an Equal Opportunity/Affirmative Action Employer.

YORK UNIVERSITY

DEPARTMENT OF MATHEMATICS

The Department of Mathematics at York University invites applications for tenure-track positions at the Assistant Professor or higher level, and limited term (one, two, or three-year) positions, commencing July 84 (subject to academic and budgetary approval). Special consideration will be given to applicants in statistics and operations research. Cross appointments with other departments are possible. Vita and three letters of reference should be sent to Chairman, Mathematics, York University, Downsview (in Toronto), Ontario M3J 1P3. In accordance with Canadian Immigration requirements, this ad is directed to Canadian citizens and permanent residents of Canada.

Mathematics Department

THE UNIVERSITY OF ALABAMA

We expect to have at least 3 tenure-track positions, probably at the Assistant Professor level. Demonstrated ability in both research and teaching is essential. The Ph.D. degree is required. Strong preference for some of these positions will be given to candidates who will contribute to the department's expanding program in applied mathematics. Applicants in all fields will be considered for the other positions. The University of Alabama, which has one of the two Ph.D. programs in mathematics in the state, is located in Tuscaloosa, a town of 80,000 which is a short drive from Birmingham. Write to A. Hopenwasser, P.O. Box 1416, University, Alabama 35486.

THE UNIVERSITY IS AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER.

Applications invited for tenure track position at Assistant Professor level beginning August 1984. Responsibilities: Teach courses in mathematics, particularly combinatorics and discrete structures for largely engineering or computer science majors and pursue research in combinatorial analysis, graph theory, etc. Candidates must have Ph.D. in Mathematics with emphasis on some area of discrete mathematics. Teaching experience is desirable. Salary: Negotiable. Send résumé and at least three letters of recommendation to David A. Sanchez, Chairman, Mathematics and Statistics, University of New Mexico, Albuquerque, NM 87131. AA/EEO.
**POSITIONS AVAILABLE**

**THE UNIVERSITY OF VERMONT**  
**CHAIRPERSON**  
**DEPARTMENT OF MATHEMATICS**

Nominations and applications are invited for the position of Chairperson of the Department of Mathematics. The Chairperson is responsible to the Dean of the College of Engineering and Mathematics for the administration and planning of instruction, research, service activities, and graduate program development.

The University of Vermont, established in 1791, is located in Burlington, situated between the Green and Adirondack Mountains on the shores of Lake Champlain. The University is organized into nine colleges and schools, and currently enrolls approximately 10,900 students. The College of Engineering and Mathematics has 1,138 undergraduate students and 237 graduate students.

The Department of Mathematics offers the Bachelor of Science Degree in Mathematics with options in applied mathematics, mathematics, and statistics, and the Bachelor of Arts Degree. The Master of Science Degree is offered through the Graduate College in biostatistics, mathematics, and statistics. There are currently 25 full-time faculty in the Department.

Candidates should possess the Ph.D. in one of the areas represented within the Department and present a record of leadership and professional accomplishment in research and teaching. The position will be available at the start of the 1984-85 academic year. Nominations of, and applications from, qualified female and minority candidates are especially invited. Nominations and applications (including résumé) must be submitted by February 1, 1984, to:

Professor Clarke E. Hermance, Chair  
Mathematics Search Committee  
Office of the Dean  
123 Votey Building  
College of Engineering and Mathematics  
University of Vermont  
Burlington, VT 05405

The University of Vermont is an Equal Opportunity, Affirmative Action Employer.

**UNIVERSITY OF DENVER**  
Department of Mathematics and Computer Science  
Senior and junior positions,

Several tenure-track positions in mathematics are available, beginning in Fall, 1984. Candidates in all areas of mathematics are invited to apply. Strong research accomplishments or evident research potential is expected, as well as some teaching experience. Mathematical fields represented in the Department include: foundations of quantum mechanics, numerical algorithms, coding theory, computational fluid dynamics and functional analysis. A theoretical computer science group has interests in: combinatorics, graph theory, optimization, and algebraic methods in discrete mathematics.

Applications, with vita and references, should be sent to Prof. James A. LaVita, Department of Mathematics and Computer Science, University of Denver, Denver, CO 80208. An Equal Opportunity Employer.

**UNIVERSITY OF WISCONSIN-SUPERIOR** invites applications for a tenure-track faculty position in Mathematical Sciences. Teach 12 hours in Computer Science and/or Mathematical Sciences. Master's degree, doctorate preferred, in Computer Science or Mathematics with emphasis in Computer Science. Applied Statistics or Operations Research background desirable. Salary $22,000—$32,000 academic year. Start Fall Quarter 1984, Application deadline 2/20/84 or until position is filled. Send application letter, résumé, and 3 letters of recommendation to Dr. Francis Florey, Mathematical Sciences Program, University of Wisconsin-Superior, Superior, WI 54880, EO/AA Employer.

**FACULTY POSITION IN COMPUTER SCIENCE**

Applications are invited for a tenure-track position at the Assistant Professor level in Computer Science, beginning with the 1984—85 academic year. Applicants must have a Ph.D. in Computer Science (prior to accepting duties) and a commitment to teaching and research. Candidates from all areas of Computer Science will be considered.

The Computer Science program at Riverside is housed in the well-established Department of Mathematics, which offers bachelor's, master's, and doctoral degrees. The department offers B.S. and M.S. degrees in Computer Science. March 1, 1984 is the deadline for filing applications.

To apply, send résumé with names of three references to:

Professor David Rush  
Chair, Search Committee  
Department of Mathematics  
University of California  
Riverside, CA 92521

The University of California is an Equal Opportunity/Affirmative Action Employer.

The Department of Mathematics at SUNY/Buffalo expects to make several faculty appointments in each of the next two years. These appointments will most likely be at the level of Assistant Professor. Salary will be competitive. There is a normal teaching load of two courses per semester. We are interested in identifying candidates with well-developed research programs who have a strong commitment to teaching. Outstanding candidates in all fields of mathematics are encouraged to apply.

Applicants should send any supporting information and have four letters of recommendation sent to:

Dr. Nicolas Goodman  
Search Committee Chairman  
Department of Mathematics  
SUNY/Buffalo  
106 Diefendorf Hall  
Buffalo, New York 14214

To assure full consideration, applications should be received by February 1, 1984.

SUNY/Buffalo is an Equal Opportunity/Affirmative Action Employer. We are interested in identifying prospective minority and women candidates. No person, in whatever relationship with the State University of New York at Buffalo, shall be subject to discrimination on the basis of age, creed, color, handicap, national origin, race, religion, sex, marital or veteran status.

**UTAH STATE UNIVERSITY**  
**MATHEMATICS DEPARTMENT**

The Mathematics Department at Utah State University anticipates the availability of tenure-track and visiting faculty positions at the Assistant, Associate, or Full Professor level beginning September 1, 1984. Duties consist of teaching undergraduate and graduate classes and engaging in research in an area of mathematics or its applications. Applicants must have a Ph.D. and provide evidence of the potential for excellence in teaching and research. Senior level applicants should indicate experience with doctoral graduate programs, particularly those with interdisciplinary aspects. Interest in numerical analysis, partial differential equations, optimization, pattern recognition, and other applied areas preferred, but not required. Rank and salary will be commensurate with experience and credentials.

Send vita and at least three letters of recommendation to Search Committee, Mathematics Department—UMC 41, Utah State University, Logan, UT 84322.  
Closing Date: February 15, 1984, or until positions are filled.

USU is an Affirmative Action/Equal Opportunity Employer.
Assistant Professor  
Department of Mathematics  
Southern Methodist University  

Applications are invited for anticipated tenure-track and visiting positions at the assistant professor level beginning September 1984. Candidates should have strong potential in research and a commitment to excellence in teaching. Preference will be given to candidates who can interact with the active groups in the department in applied mathematics. These include numerical analysis, mathematical modeling, and asymptotic methods. Special consideration will be given to candidates in the field of scientific computation.

The department has a Ph.D. program; teaching loads are two courses per semester.

Candidates should send a vita and arrange to have three letters of reference sent to Professor George W. Reddien, Chairman, Department of Mathematics, Southern Methodist University, Dallas, Texas 75275.

The University is an Equal Opportunity/Affirmative Action/Title IX employer.

Senior Position  
ALGEBRAIC GEOMETRY  

The Department of Mathematics at the University of Arizona seeks to fill a senior level position in algebraic geometry as a first step toward the development of a research group in this area. Applicants should have an established and internationally recognized record of excellence in research, the ability to provide scientific leadership, and a commitment to teaching at both the undergraduate and graduate levels. It is expected that this group will have significant interaction with the Department's existing programs in nonlinear analysis and in algebraic number theory. Applications, which should include a curriculum vitae and the names of at least three suggested references, may be sent to: Algebraic Geometry Search Committee, Department of Mathematics, University of Arizona, Tucson, AZ 85721.

EEO/AA

DEPARTMENT OF MATHEMATICS  
COLLEGE OF CHARLESTON  

Applications are invited for at least two tenure-track positions at the junior or senior level available Fall 1984. Candidates must have a Ph.D. in mathematics or a related field, a commitment to undergraduate teaching, and potential for continuing research. The normal teaching load is 12 hr/wk with course reductions for those engaged in research. The minimum salary is $23,000. Internal grants for release-time or financial support for research projects are available as is travel support. Applicants should send a vita and have three letters of recommendation sent to William L. Golightly, Chairman, Department of Mathematics, College of Charleston, Charleston, SC 29424. The College of Charleston is an Affirmative Action/Equal Opportunity Employer.

EEO/AA

MATHMATICS DEPARTMENT  
UNIVERSITY OF GEORGIA  
Athens, Georgia 30602  

Professor of Mathematics  

Applications are invited for a three-year tenure-track appointment beginning August 1984. Responsibilities: Teach courses in mathematics with particular emphasis on one of the following areas: algebra or number theory, algebraic geometry, differential geometry, differential or algebraic topology or global analysis, and pursue individual research in one of these areas. The University is an equal opportunity, affirmative action employer.

Department Head, new Department of Computer Science  
University of Georgia, Athens, Georgia 30602  

Professor of Mathematics  

Applications are invited for assistant professor level beginning January 1984. Responsibilities: Teach courses in mathematics with particular emphasis on one of the following areas: algebra or number theory, algebraic geometry, differential geometry, differential or algebraic topology or global analysis, and pursue individual research in one of these areas. The University is an equal opportunity, affirmative action employer.

EEO/AA
UNIVERSITY OF NORTH FLORIDA
Applications are invited for three (3) tenure-track assistant professorships. Candidates should have a Ph.D. in mathematics or statistics, strong teaching ability, and continuing scholarly activity. Duties include teaching major, graduate, and service courses. The Department offers the B.A. and B.S. degrees in mathematics and statistics, and the M.A. with tracks in mathematics, statistics, and computer science.

Send résumé and three letters of recommendation by February 15, 1984 to:
William H. Caldwell, Chairperson
Department of Mathematical Sciences
University of North Florida
4567 St. Johns Bluff Road
Jacksonville, FL 32216

Further information available upon request. An AA/EEO Employer.

The Department of Statistics and Probability at Michigan State University, East Lansing, Michigan, will have a tenure track position available September 1, 1984. The position is at the rank of Assistant Professor.

Applicants should have strong research interests in Statistics or Probability or both and ability to teach undergraduate and graduate courses in these subjects. The applications will be accepted until the candidate is selected.

Please send your application with résumé and three letters of reference to:
Chairman
Department of Statistics and Probability
Michigan State University
East Lansing, Michigan 48824

Michigan State University is an equal opportunity employer.

FLORIDA INTERNATIONAL UNIVERSITY
Miami, Florida

Due to increased enrollment, the Department of Mathematical Sciences will have several tenure-track positions at the Assistant Professor level beginning August, 1984. Duties include teaching at the undergraduate and beginning graduate levels, research and service. Candidates must have a Ph.D. degree in Mathematics, demonstrated teaching ability and research potential. Preferred areas of specialization are harmonic analysis, recursive function theory, differential geometry, analytic number theory and probability. Qualified candidates in other areas will be considered. Salary is competitive. Applicants should send résumé and three letters of reference to:
Dr. Carlos W. Brain, Chairperson
Recruitment Committee
Department of Mathematical Sciences
Florida International University
Miami, Florida 33199

Florida International University is a member of the State University System of Florida and is an Affirmative Action/Equal Opportunity Employer.

Assistant Professorships (2) in Mathematics, 1984–85. One is tenure-track. Applicants should hold a Ph.D. degree (by 6/84), be committed to quality teaching, and desire to make a positive contribution to a church-related liberal arts college. Individuals with credentials in probability/statistics or combinatorics/mathematics of computation are particularly encouraged to apply. Application materials, consisting of a copy of the curriculum vitae, graduate and undergraduate transcripts, and three letters of recommendation (including comments on the applicant's teaching potential) should be received no later than February 15, 1984. Send all materials to Dr. John T. Kemper, Chair, Department of Mathematics, College of St. Thomas, St. Paul, Minnesota 55105. The College of St. Thomas is an equal opportunity/affirmative action employer.

RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY

The Department of Mathematics, New Brunswick, NJ, anticipates the following open positions beginning September 1984:

1. TENURE-TRACK ASSISTANT PROFESSORSHIPS. Responsibility for teaching and research. Normal course load approx. 7 hours. Candidates must have Ph.D., outstanding research ability in pure or applied mathematics, and concern for teaching. Preference will be given to individuals working in numerical analysis.

2. HILL ASSISTANT PROFESSORSHIPS. Responsibility for teaching and research. Normal course load approx. 7 hours. Candidates of any age must have recently received Ph.D., show outstanding promise in research ability in pure or applied mathematics, and have concern for teaching. These are three-year non-renewable positions.

3. VISITING POSITIONS. Responsibility for teaching and research. Normal course load approx. 7 hours. These positions are intended to permit individuals with regular appointments elsewhere to visit Rutgers for the purpose of engaging in joint research with members of the faculty. Candidates must have Ph.D., proven record of outstanding research accomplishments in pure or applied mathematics, and concern for teaching. These are one or two year non-renewable positions.

4. LECTURESHIPS (Assistant Professor level). Responsibility for teaching and research. Normal course load approx. 7 hours. Candidates must have Ph.D., show outstanding promise in research ability in pure or applied mathematics, and have concern for teaching. These are one or two year non-tenure-track positions.

5. LECTURESHIPS (Instructor level). Primary responsibility for teaching. Normal course load 9-10 hours. Candidates must have Ph.D., teaching experience at the college level, and some interest in research. These are one or two year non-tenure-track positions.

6. INSTRUCTORSHIPS. Responsibility for teaching, mainly at the level of precalculus and below. Normal course load 12 hours. Candidates must have masters degree or equivalent related experience and provide evidence of teaching ability. These are one or two year non-tenure-track positions.

RUTGERS UNIVERSITY IS AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER.

RUTGERS, THE STATE UNIVERSITY
Camden, New Jersey

The Department of Mathematical Sciences expects to have a tenure track position in mathematics open in July 1984; rank is open. Applicant should be a Ph.D. in mathematics and have demonstrated a strong commitment to research and teaching.

Send résumé, list of publications, and three letters of recommendation to:
Professor Martin Karel
Chairman, Search Committee, Dept. of Math, Rutgers University, New Brunswick, NJ 08903 by March 1, 1984.

Indicate position desired. RUTGERS UNIVERSITY IS AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER.

MATHEMATICS—Assistant Professor position available at Stamford Regional Campus to teach 3-4 courses per semester of elementary and intermediate mathematics and to conduct research in field of specialization. Ph.D. in mathematics and some teaching experience required; however, candidates expecting to complete thesis will also be considered. Research potential desirable. Screening of applicants will begin 2/15/84.

POSITIONS AVAILABLE

LOYOLA COLLEGE, MATH DEPARTMENT
BALTIMORE CAMPUS
4501 NORTH CHARLES STREET
BALTIMORE; MARYLAND 21210

A tenure track position is available for Fall '84. Candidates should have a Ph.D. in a mathematical science with a background in one or several of the following areas: combinatorics, graph theory, mathematical programming, numerical analysis, computational complexity, or algorithm design. The Department offers a strong undergraduate program in Math Sciences. Teaching duty is 3 courses/semester. Moderate amount of research required. Applicants should send vita and three (3) letters of recommendation to Dr. John Hennessey, Chairman. Résumés received after February 1, 1984 may not be considered.

Affirmative Action Employer

SUNY College at Brockport

Tenure-track assistant professorship in the Department of Mathematics/Computer Science available September 1984. Applicants should have a Ph.D. in Mathematics with expertise in Statistics/Operations Research and a strong commitment to the teaching of Mathematics at the Undergraduate and Master's level. For more information, contact Dr. K. Nakano Chairperson, Department of Mathematics/Computer Science (Phone: 716-395-2194). To apply, send letter of application and resume and have three letters of reference sent by February 20, 1984 to: Faculty/Staff Relations Office, SUNY College at Brockport, Brockport, NY 14420. An Equal Opportunity/Affirmative Action Employer.

SUNY College at Brockport

Applications invited for a tenure-track position in our established Computer Science program of over 400 majors at the Instructor/Assistant Professor level starting September 1984. Applicants should have a Ph.D. in Mathematics with expertise in Statistics/Operations Research and a strong commitment to CS education required. Salary is open and competitive. For more information contact Dr. K. Nakano, Mathematics/Computer Science Department (Phone: 716-395-2194). To apply, send letter of application, resume, and three letters of reference by March 1, 1984 to: Office of Faculty/Staff Relations, SUNY College at Brockport, Brockport, NY 14420. An Equal Opportunity/Affirmative Action Employer.

The Department of Mathematics at Trinity College invites applications for a visiting assistant professorship starting in September, 1984. The appointment will be for a term of three years.

The requirements for the position are: demonstrated excellence as a teacher, especially at the first- and second-year levels; a knowledge of statistics or applications of mathematics; some familiarity with computing; and a Ph.D. in the mathematical sciences.

The normal teaching load is three courses per semester. Trinity College is an Equal Opportunity/Affirmative Action employer. Women and members of minority groups are encouraged to apply and to identify themselves in their letters of application.

Applicants should submit a detailed curriculum vitae, and academic record, and at least three letters of reference to:

David A. Robbins, Chairman
Department of Mathematics
Trinity College
Hartford, CT 06106

All applications will be acknowledged; they should be received by February 17, 1984.

Representatives of the Department will be at the AMS Annual Meeting in Louisville to interview potential candidates.

MATHEMATICS: Tenure-track positions in one or more of the following areas: Assistant or Associate Professor ($20,868–$26,316, academic year, dependent upon qualifications).

COMPUTATIONAL MATHEMATICS: Requires Ph.D. in numerical analysis or computational mathematics. Candidate will teach and develop undergraduate course(s) for math, computer science, and engineering students who have taken linear algebra and calculus, and direct master's thesis in applied mathematics. Research activity and experience with industrial applications are highly desirable.

MATHEMATICS EDUCATION: Requires Ph.D. in mathematics education. Candidate will teach and advise elementary and secondary teacher trainees, advise master's degree candidates in mathematics education, and teach a wide variety of undergraduate service courses. Candidate will be responsible for developing and implementing a computer literacy component into both the elementary and secondary teacher mathematics courses. Research interests and experience in mathematics education is desirable.

HISTORY OF MATH or TOPOLOGY: Requires Ph.D. in mathematics, with specialization in history of math, or topology. Candidate will teach undergraduate service courses. Research activity and wide teaching interests are desirable.

Deadline for applications: January 13, 1984. Applications must include completed application form, résumé, three letters of reference, and confirmation of highest degree. Apply to:

The Search Committee (specify position) Mathematics Department
California State Polytechnic University, Pomona
3801 West Temple Avenue
Pomona, California 91768-4033

Cal Poly Pomona is an equal opportunity/affirmative action, Title IX, 504 employer. Women, minorities, and disabled persons are encouraged to apply.

BOSTON UNIVERSITY

Department of Mathematics

The Department of Mathematics at Boston University anticipates several openings for Assistant Professors or Visiting Faculty members beginning September 1984, pending budgetary approval. Teaching load: 6 hours/week. Preference given to applicants who share research interests with current faculty members in algebraic geometry, number theory, probability and statistics, and dynamical systems and related areas. Women and minorities are especially encouraged to apply. Vita and three letters of reference to Search Committee, Department of Mathematics, Boston University, Boston, MA 02215.

Boston University is an Equal Opportunity/Affirmative Action Employer.

State University College of Arts and Science
Geneseo, New York 14454

Applications are invited for two full-time faculty positions in computer science to begin in September 1984. These are additional positions in an expanding department.

The positions require a minimum of a Master's degree in a computer related field (Ph.D. preferred), teaching ability in Pascal, FORTRAN or COBOL, and a demonstrated background in two or more of the following areas: theory of programming languages, operating systems, computer architecture, data communications, or theoretical computer science.


Dr. Lee T. Bryant
Computer Science Department
State University College
Geneseo, New York 14454

AA/EOE
POSITIONS AVAILABLE

Macalester College

Applications are invited for one or two tenure track positions at the assistant professor level, beginning Fall 1984. Applicants should have or be near completion of Ph.D. in either Mathematics or Computer Science and be capable of teaching some CS courses beyond elementary programming. Competitive salary, good benefits. Contact John Schue, Chairman, Department of Mathematics and Computer Science, Macalester College, St. Paul, Minnesota 55105 by March 1, 1984.

EASTERN MICHIGAN UNIVERSITY

Department of Mathematics and Computer Science invites applications for several tenure track Assistant Professorships in Mathematics for the Fall semester 1984. All areas of specialization will be considered. The doctorate in a mathematical science is required. Eastern Michigan University offers a competitive salary and an excellent fringe benefits package.

Please obtain the application form from our Personnel Department and send it and your resume, transcripts, and letters of recommendation by the deadline of February 29, 1984, to Personnel Department, 310 King Hall, Eastern Michigan University, Ypsilanti MI 48197 (313) 487-3430. Eastern Michigan University is an Equal Opportunity/Affirmative Action Employer.

Tsing Hua University, TAIWAN, R. O. C.

Mathematics Department

Several teaching positions (beginning Aug. 1, 1984) in Mathematics are currently open for interested applicants. In order to ensure full considerations, applications (including brief curriculum vitae and publications (including Ph.D. thesis)) and three letters of recommendation should be sent prior to Feb. 15, 1984 to:

Chairman
Huei-Shyong Lue
Dept. of Mathematics
Tsing Hua University
Hsinchu, Taiwan 300
R. O. C.

MEMPHIS STATE UNIVERSITY

The Department of MATHEMATICAL SCIENCES invites applications for tenure-track positions at all ranks and in all areas of the mathematical sciences (including mathematics, computer science, and statistics) for Fall 1984. The Ph.D. degree and strong potential for excellence in teaching and research are desired.

The Department is committed to continued growth and development of its pure and applied programs. A Ph.D. is offered in mathematics and applied statistics.

Applications should submit a resume (include names of 3 or 4 references) by March 1, 1984 to:

Ralph Faudree, Chairman
Department of Mathematical Sciences
Memphis State University
Memphis, Tennessee 38152

An Equal Opportunity/Affirmative Action Employer

The Department of Mathematics and Statistics at Mississippi State University anticipates two or more tenure-track positions at the Assistant Professor level for the 1984–1985 academic year. A Ph.D. is preferred. Responsibilities include teaching and research. Candidates should submit a vita and three letters of recommendation by February 1, 1984, to

J. L. Solomon, Head, Department of Mathematics and Statistics, Mississippi State, MS 39762. Mississippi State University is an equal opportunity/affirmative action employer.

SOUTHERN ILLINOIS UNIVERSITY

CARBONDALE, IL 62901

Applications are invited for an assistant professor, tenure-track position in Mathematics Education in the Department of Mathematics at Southern Illinois University at Carbondale, starting August 16, 1984. Qualifications for the Position: A Ph.D. in Mathematics is required. Candidates must have demonstrated evidence of excellence in research and potential for such in Math Education. Evidence of teaching excellence is preferred. The salary will be competitive. Closing date: February 1, 1984, or until position is filled. Applications plus three letters of recommendation should be sent to: Mathematics and Statistics Hiring Committee, SIU-C, Carbondale, Illinois 62901. SIU-C is an Equal Opportunity/Affirmative Action Employer.

SOUTHERN ILLINOIS UNIVERSITY

CARBONDALE, ILLINOIS 62901

Applications are invited for an assistant, tenure-track position in Numerical Analysis in the Department of Mathematics at Southern Illinois University at Carbondale, starting August 16, 1984. Qualifications for the Position: Ph.D. required. Candidates must have demonstrated evidence of excellence in research and potential for such in Numerical Analysis. Evidence of teaching excellence is preferred. The salary will be competitive. Closing date: February 1, 1984, or until position is filled. Applications plus three letters of recommendation should be directed to: Numerical Analysis Position, c/o Alphonse Baartmans, Chairman, Department of Mathematics, Southern Illinois University, Carbondale, Illinois 62901. SIU-C is an Equal Opportunity/Affirmative Action Employer.

SOUTHERN ILLINOIS UNIVERSITY

CARBONDALE, ILLINOIS 62901

Applications are invited for an assistant, tenure-track position in Combinatorics in the Department of Mathematics at Southern Illinois University, starting August 16, 1984. Qualifications: Ph.D. in Mathematics is required. Candidates must have demonstrated evidence of excellence in Research and potential for such in Combinatorics or some area of computer-related mathematics. Preference will be given to candidates with background and experience in computer science. The salary will be competitive. Closing date: February 1, 1984, or until position is filled. Application plus three letters of recommendation should be directed to: Combinatorics Position, c/o Alphonse Baartmans, Chairman, Department of Mathematics, Southern Illinois University, Carbondale, Illinois 62901. SIU-C is an Equal Opportunity/Affirmative Action Employer.

Mathematics and Statistics Dept., CSU Sacramento, CA 95819

(3) TENURE-TRACK POSITIONS; assistant professor level (salary $20,868 to $22,896, approximate 5.8% salary increase will be effective January 1, 1984), beginning August 1984; Require Math or Stat Ph.D.; 12 unit per semester teaching load; Applicants must be committed to excellence in teaching. The department will give special consideration to applicants who desire to teach courses in applied statistics or computer-oriented mathematics, or who have research potential in any area of mathematics. Respond by 2/1/84.

(2) ONE-YEAR LECTURER POSITIONS; with possibility of reappointment (salary $19,044 to $22,856, approximate 5.8% salary increase will be effective January 1, 1984), beginning August 1984; Require Math or Stat Ph.D.; 12 unit per semester teaching load; Applicants must be committed to excellence in teaching. Respond by 3/1/84. Résumé, transcripts and 3 letters of recommendation (at least one attesting to teaching ability) should be sent to: Mathematics and Statistics Hiring Committee.

CSUS is an Equal Opportunity Employer.
**POSITIONS AVAILABLE**

JOHN D. MACARTHUR VISITING PROFESSORSHIP  
NEW COLLEGE, Sarasota, Fl.

New College is one of sixteen distinguished liberal arts colleges to be honored by an endowed professorship from the MacArthur Foundation. The position will be in the Division of Natural Sciences which includes mathematics, physics, chemistry, biology, experimental psychology, and computer science. We seek a scholar who is committed to teaching motivated undergraduates in the classroom and in individual projects, and who would complement our program. Although we particularly solicit applications broadly based in computer science or computer applications, we do encourage applicants from any discipline listed above or related to them, e.g., astronomy, artificial intelligence, biochemistry.

We invite applications for either a one-or-two-year appointment. The salary will depend on qualifications; for recent Ph.D.’s it will be more than competitive.

New College is a small, highly selective, residential liberal arts college. It combines highly talented and motivated students (average SAT scores over 1200) with outstanding faculty in a program which includes close faculty-student interaction in the classroom, and in research and independent study. Since its merger with the University of South Florida in 1975, New College has been the honors academic program.

Applications, including a brief statement of research interests and possible course offerings and the names of three references, should be sent by January 30, 1984 to Peter A. Kazaks, Chairman, Division of Natural Sciences, New College of USF, 5700 North Tamiami Trail, Sarasota, Florida 33580.

UNIVERSITY OF NORTH CAROLINA–ASHEVILLE

Department of Mathematics

Two tenure-track positions at the level of assistant or associate professor, beginning August 1984. The Ph.D. is required, preferably in analysis or related area, with some training in physics, chemistry, biology, experimental psychology, and computer science. We seek a scholar who is committed to teaching motivated undergraduates in the classroom and in individual projects, and who would complement our program. Although we particularly solicit applications broadly based in computer science or computer applications, we do encourage applicants from any discipline listed above or related to them, e.g., astronomy, artificial intelligence, biochemistry.

We invite applications for either a one-or-two-year appointment. The salary will depend on qualifications; for recent Ph.D.’s it will be more than competitive.

New College is a small, highly selective, residential liberal arts college. It combines highly talented and motivated students (average SAT scores over 1200) with outstanding faculty in a program which includes close faculty-student interaction in the classroom, and in research and independent study. Since its merger with the University of South Florida in 1975, New College has been the honors academic program.

Applications, including a brief statement of research interests and possible course offerings and the names of three references, should be sent by January 30, 1984 to Peter A. Kazaks, Chairman, Division of Natural Sciences, New College of USF, 5700 North Tamiami Trail, Sarasota, Florida 33580.

**ANNOUNCEMENT OF POSITIONS IN COMPUTER SCIENCE**

DEPAUL UNIVERSITY  
CHICAGO, ILLINOIS

DePaul University invites applications for tenure-track positions in Computer Science at all levels. The starting date is September 1984. Any area of specialization will be considered. An applicant should hold a Ph.D. in Computer Science or be a candidate for such a degree; consideration will also be given to holders of Ph.D. degrees in Mathematics or related fields who express an interest in Computer Science. Duties include a six-hour teaching load and research. Salary details and salary are negotiable. Benefits include TIAA and standard health insurance. U.S. citizenship is not required.

The Department of Computer Science and Information Systems at DePaul has over 1100 majors which are nearly equally divided between undergraduate and graduate students. Facilities include two VAX 11/780’s, a VAX 11/750, an IBM 4331, a PDP 11/60, a PDP 11/44, a PDP 11/23, ten LSI-11’s, and numerous microcomputers. The Department is in the process of equipping a Robotics and Vision Laboratory. Faculty interests include artificial intelligence, computer vision, applied statistics, applied graph theory, information systems, compiler design, semantics of programming languages, and computer architecture.

Applications will be received until positions are filled. Send résumé and at least three letters of reference to: Helmut P. Epp, Chairman, Department of Computer Science and Information Systems, DePaul University, 243 S. Wabash, Chicago, IL 60604.

DePaul University is an equal opportunity employer.

Applications are invited for two tenure-track positions in mathematics at the assistant professor level effective January 1, 1984 (subject to availability of funds). Requirements are a Ph.D. and proven ability or demonstrated potential for research and teaching. Outstanding applicants in any area of mathematics will be seriously considered but preference will be given to applicants whose research interests substantially complement present department strengths. Send vita and names of three references to: Dr. K. A. Dunn, Chairman, Department of Mathematics, Statistics and Computer Science, Dalhousie University, Halifax, N. S., Canada B3H 4H8.

In accordance with Canadian Immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada.

Dalhousie has a policy of affirmative action with respect to employment of women.

The Department of Mathematics anticipates a tenure-track position at the Assistant Professor level beginning August 1984. Candidates should have a Ph.D. and show promise of ability in teaching and research. The research area of the candidate should complement existing research interests in the Department; priority will be given to the areas of statistics or combinatorial designs and algebras. Salary is competitive and benefits include University paid TIAA, medical, dental, group life. Closing date is February 15, 1984, although late applications may be considered. Résumés and 3 letters of recommendation should be sent to Richard J. Fleming, Department of Mathematics, Central Michigan University, Mt. Pleasant, MI 48859.

CMU is an AFFIRMATIVE ACTION/EQUAL OPPORTUNITY INSTITUTION.

University of South Carolina at Spartanburg  
Spartanburg, SC 29303

Apply to: Dr. Celia L. Adair, Chair, Search Committee  
Position Title: Tenure-track position(s) in mathematics  
Salary: Open

Qualifications: Ph.D. and ability to teach support courses for applied mathematics and computer science  
Effective date: Fall Semester, 1984

Expertise: Teach courses which include differential equations, discrete structures, numerical analysis, and applied statistics.
**POSITIONS AVAILABLE**

Washington University in St. Louis  
Department of Mathematics  
St. Louis, MO 63130

Five tenure track positions open beginning fall 1984.

Three of the positions are open to any candidate with outstanding research ability in a field represented in the department and who can provide evidence of excellence in teaching. Applications from candidates in Differential Geometry and Commutative Algebra-Algebraic Geometry will be especially welcome.

One of the positions is for a candidate sufficiently knowledgeable in Applied Mathematics and Computing to lead the Department in creating and teaching new applied undergraduate courses, such as applied PDE, numerical analysis and linear programming.

Another of the positions is for a candidate sufficiently knowledgeable in computing to assume the Directorship of a College-wide Committee on Computing which will be responsible for teaching introductory level Computing courses and for the introduction of computing into existing courses.

Candidates for the latter two positions should be doing Mathematical Research, either basic or applied. Rank and salary of these two positions will be dependent upon the qualifications of the candidate.

Applications will be accepted until the positions are filled.

Send a letter of application, vita, and three letters of reference to: G. R. Jensen, Active Chairman, Department of Mathematics, Box 1146, Washington University, St. Louis, MO 63130. Washington University is an AA/EEO.

Assistant/Associate/Full Professor – Tenure-track or visiting positions, available Fall 1984. Teach courses in mathematics at graduate and undergraduate levels. Participate in department research effort in areas of expertise. Ph.D. in Mathematics preferred. Demonstrated commitment to research in Applied and Computational Mathematics and to teaching. Should have the ability and background to contribute to the development of department’s program in applied and computational mathematics. Preference given to applicants whose research involves numerical solution to PDE, Parallel Processing, CAD, or related areas of Numerical Analysis.

Salary negotiable. Screening begins February 15, 1984. Contact: Eugene Spiegel, Department Head, Mathematics Department, The University of Connecticut, Storrs, CT 06268. THE UNIVERSITY OF CONNECTICUT IS AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER.

Mathematics – Assistant Professor position available at Stamford Regional Campus. To teach 3–4 courses per semester of elementary and intermediate mathematics and to conduct research in field of specialization. Ph.D. in mathematics and some teaching experience required; however, candidates expecting to complete thesis will also be considered. Research potential desirable. Screening of applicants will begin 2/15/84. Salary negotiable. Contact: Dr. Eugene Spiegel, Department Head, Department of Mathematics, The University of Connecticut, Storrs, CT 06268. THE UNIVERSITY OF CONNECTICUT IS AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER.

VISITING POSITIONS available for one or both semesters of the 1984-85 academic year. Teach courses at the graduate and undergraduate levels. Participate in the departmental seminars and research efforts. Ph.D. in mathematics preferred. Preference given to those having the ability to interact with research areas represented in the department. Screening begins February 15, 1984. Contact: Dr. Eugene Spiegel, Department Head, Department of Mathematics, The University of Connecticut, Storrs, CT 06268. THE UNIVERSITY OF CONNECTICUT IS AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER.

**WESTERN NEW MEXICO UNIVERSITY**

Silver City, New Mexico 88062

Applications for a tenure track Assistant or Associate Professor in Mathematics and/or Computer Science are now being accepted for Fall 1984 by WNNU. Applicants should be able to teach at the Undergraduate level, preferably in both areas. The emphasis of the department is on quality teaching, with opportunities for research available. Applicants should have a Ph.D. in an appropriate discipline or be near completion of a Ph.D. program. Salary competitive.

The University is located in Northwestern New Mexico at an elevation of 6000 feet. The climate is ideal with mild winters and moderate summers. The country's second largest national forest lies nearby. Western is at the hub of this region and provides the basis for quality life. Deadline for applications is February 15, 1984 or when position is filled. Women and minorities are encouraged to apply.

WNMU is  
An Affirmative Action/Equal Opportunity Employer

**THE UNIVERSITY OF TULSA**  
MATHEMATICS

The Department of Mathematical and Computer Sciences invites applications and nominations for tenure track positions in mathematics at the rank of assistant or associate professor. Responsibilities include teaching nine hours per semester, continuing scholarly activity, and dedication to the goals of high quality private education. Minimum qualifications are the Ph.D. in mathematics or a related discipline and a strong commitment to teaching. Salary is negotiable and competitive.

The closing date is February 20, 1984 or until the positions are filled. Send vita, transcripts, and three letters of reference to: William A. Coberly, Chairman, Department of Mathematical and Computer Sciences, University of Tulsa, 600 S. College, Tulsa, Oklahoma 74104.

The University of Tulsa has an Equal Opportunity/ Affirmative Action program for students and employees.

**UNIVERSITY OF ALABAMA IN HUNTSVILLE**  
Department of Mathematics

A tenure track position beginning September 1, 1984 is anticipated. Rank and salary commensurate with experience and credentials. Strong evidence of excellent research ability and a specialty area of numerical analysis, differential equations (ordinary or partial), or mathematical modeling are required. Funded research experience is highly desirable. The University of Alabama in Huntsville has over 6,000 students and offers graduate degrees in all mathematical science, natural science, and engineering disciplines.

Send letter of application, vita, and three letters of reference to: F. L. Cook, Chairman, Department of Mathematics, University of Alabama in Huntsville, Huntsville, Alabama 35899. Screening of applicants will begin February 10, 1984. The University of Alabama in Huntsville is an Affirmative Action/Equal Opportunity Institution.


Southern Technical Institute offers four-year degrees in Engineering Technology and is located in Marietta, GA, a suburb of Atlanta. Most teaching is in the lower division.

A complete application consists of an application letter, a complete résumé, three letters of reference, and transcripts of all college work. Applications completed by 15 February 1984 will be considered first.

Inquiries and applications should be addressed to:  
Dr. H. R. Andrews, Chairman  
Mathematics Search Committee  
Southern Technical Institute  
Marietta, GA 30060

104
**POSITIONS AVAILABLE**

**MICHIGAN TECHNOLOGICAL UNIVERSITY** – Several tenure-track positions in applicable mathematics (e.g., probability, fluid mechanics, ODE, PDE, etc.) statistics, operations research, numerical analysis, and computer science as well as visiting positions in all areas are available. Assistant or associate professors preferred. Excellent research and teaching required. Some 3-year instructorships are also open. Houghton has temperatures moderated by Lake Superior with a great deal of snow and recreational activities. To apply, write to R. Millman, Mathematical and Computer Sciences, Michigan Technological University, Houghton, Michigan 49931. MTU is an equal opportunity educational institution/equal opportunity employer.

**BURROUGHS CORPORATION, ADVANCED TECHNOLOGY DIVISION-AUSTIN RESEARCH CENTER** has a research position available in mathematical logic. Candidates must have solid theorem-proving ability and should have some training in mathematical logic. Familiarity with lambda-calculus, Scott-Strachey semantics, and higher-order logic is desirable. Computer science background in LISP, applicative languages, mechanical theorem proving, program research, or A.I. is desirable. Applicant must be willing to work on specific problems in logic and semantics related to applicative (functional) programming languages. Send résumé to Dr. Carl Pixley, Burroughs Corporation, ATD-Austin Research Center, 12201 Technology Blvd., Austin, Texas 78727. Burroughs Corporation is an Equal Opportunity/Affirmative Action employer.

**UNIVERSITY OF THE PACIFIC, DEPARTMENT OF MATHEMATICS, STOCKTON, CA** will offer an Assistant Professorship, tenure track, starting August 1984. Applicants must possess a Ph.D. in Mathematics or related fields. The Department offers undergraduate programs in applied analysis/differential equations, operations research, probability/statistics, and computer science. Candidates should have a strong commitment to undergraduate teaching. Salary competitive. Send résumé by February 22, 1984 to William Topp, Chairman, Department of Mathematics.

**FACULTY POSITION WESLEYAN UNIVERSITY**

Tenure-track position in Computer Science beginning fall 1984. (Likely at Assistant Professor level, but qualified senior candidates also encouraged.) Area of specialization open. Applications received by February 15, 1984, given full consideration. Send vita and three letters of recommendation to Carol Wood, Mathematics Department, Wesleyan University, Middletown, CT 06457.

(An Equal Opportunity/Affirmative Action Employer)

**UNIVERSITY OF NORTHERN IOWA: STATISTICS POSITION**

Tenure track position in statistics at Assistant/Associate Professor level tentatively available. Salary and benefits competitive. Doctorate in statistics, demonstrated teaching ability, and scholarly productivity and promise required. Closing date of March 20, or later if position is still open. For complete announcement, contact Dr. David Duncan, Head, Department of Mathematics and Computer Science, University of Northern Iowa, Cedar Falls, IA 50614. An equal opportunity/affirmative action employer.

**ARIZONA STATE UNIVERSITY**

Department of Mathematics

Applications are invited for positions at ranks of Assistant and Associate Professor. There is a possibility of appointments at Professor rank. Visiting positions are also expected. Send vita and direct 3 letters of recommendation to J. Bustoz, Chair, Department of Mathematics, Arizona State University, Tempe, AZ 85287. A.S.U. is an equal opportunity employer.

**BRYN MAWR COLLEGE**

Applications are invited for a tenure-track position in Mathematics at the Assistant Professor level, beginning September 1984. Candidates must have a Ph.D. in Mathematics and have demonstrated strong research potential and excellence in teaching. Applications, résumés and three letters of recommendation should be sent to M. Martelli, Acting Chairman, Department of Mathematics, Bryn Mawr College, Bryn Mawr, PA 19010 by January 15, 1984. Bryn Mawr College is an Equal Opportunity/Affirmative Action Employer.

**FOR SALE**

**MATH SCI PRESS, 53 Jordan Rd., Brookline, MA 02146; 617-738-0307.** Just published: *Geometry of Riemannian Spaces*, by Elie Cartan. Translation by James Glazebrook of 1946 edition, notes by R. Hermann. $50. 20% reduction on two or more volumes of entire list (see ad in Oct. '82 Notices) of 35 volumes.

Five day service on Russian translations in mathematics, statistics and probability theory from preprints, reprints and short journal articles. PROTRANS, 100 Gilian Drive, Athens, Georgia, 30606.

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For Sale: *KNOT THEORY*, Reidemeister, English edition, paperback, $13.50 prepaid, $14.95 otherwise. Also, we consider university level mathematics manuscripts for publication. BCS Associates, P.O. Box 3614, Moscow, Idaho 83843, USA.


**MATHEMATICAL REVIEWS, SIAM REVIEW, SIAM CONTROL, all 1975–1979.** Professor Schaible, University of Alberta, Edmonton, Canada T6G 2G1.

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105
Embedding Coverings into Bundles with Applications

P. F. Duvall and L. S. Husch

The problem of when a finite regular covering of an n-dimensional closed piecewise linear manifold M can be homotoped to an embedding in an n-plane bundle over M is solved. As a corollary, a generalization of the Borsuk-Ulam Theorem is obtained. These results are then applied to the problem of embedding up to shape in 2n-dimensional Euclidean space continua which are the inverse limits of n-dimensional manifolds. An example of such a continuum which does not embed up to shape in 2n-space is given.

Prepayment is required for all AMS publications. Order from AMS, P. O. Box 1571, Annex Station, Providence, RI 02901, or call toll free 800-556-7774 to charge with Visa or MasterCard.
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All employers in the United States are required to abide by the requirements of Title VII of the Civil Rights Act of 1964, announcing a national policy of equal employment opportunity in private employment, without discrimination because of race, color, religion, sex, or national origin. All U.S. listings are accepted with the understanding that the employer complies with federal requirements. Advertisers not subject to U.S. laws are required to sign a statement that they do not discriminate in employment on grounds of age, race, color, religion, sex, or national origin. Applicants should be aware that institutions outside the U.S. may not be legally bound to conform to these or similar requirements and the AMS cannot assume responsibility for enforcing compliance. Applicants are advised to inform themselves of conditions that may exist at the institutions to which they apply.

In particular, readers should note that the Equal Employment Opportunity Act (42 U.S.C., §§2000e et seq.), which prohibits discrimination in employment on the basis of sex, race, religion, or national origin, contains (in §2000e–1) an exception from the provisions of the Act for any religious corporation, association, educational institution, or society with respect to employment of individuals of a particular religion to perform work connected with the carrying on by such corporation, association, educational institution, or society of its activities. The Age Discrimination in Employment Act of 1967 (29 U.S.C., §§621 et seq.), makes it unlawful for an employer to discriminate against any individual between the ages of 40 and 65 because of age. Thus it is legal to seek as an employee someone who is "over 30," but not one "over 50"; neither is it legal to express a preference for someone who is "young," or is a "recent graduate," since the latter tend (on statistical grounds) to be young.

The McConnell-Bernard Professorship in Mathematics

UNIVERSITY OF VIRGINIA

The Department of Mathematics wishes to fill the McConnell-Bernard Professorship in Mathematics. Applications for this senior position are invited from distinguished research mathematicians. Nominations for candidates are also welcome. All areas of pure and applied mathematics will be considered.

Submit vita and names of references to:

Chairman
Department of Mathematics
Mathematics-Astronomy Building
University of Virginia
Charlottesville, Virginia 22903

The University of Virginia is an Equal Opportunity/Affirmative Action Employer.

UNIVERSITY OF HOUSTON
University Park
DEPARTMENT OF MATHEMATICS
M. D. Anderson Chair

The Department seeks applications or nominations for the M. D. Anderson Professorship of Mathematics.

The holder of this chair should have outstanding credentials in research and teaching, and is expected to provide scientific leadership for the Department.

The Department is emphasizing development in the applied areas of mathematics and special consideration will be given to candidates in these fields. Inquiries, however, are welcome from people specializing in any area of mathematics.

All inquiries, nominations or applications should be sent to:

Professor Garret J. Etgen, Chairman
Department of Mathematics
University of Houston-University Park
Houston, TX 77004 (713) 749-4827

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<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Edition</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTORY MATHEMATICAL ANALYSIS</td>
<td>Richard Paul, Ernest Haeussler</td>
<td>4/e</td>
<td>1983</td>
</tr>
<tr>
<td>CALCULUS FOR BUSINESS</td>
<td>Ernest Haeussler, Richard Paul</td>
<td></td>
<td>1984</td>
</tr>
<tr>
<td>ALGEBRA AND TRIGONOMETRY</td>
<td>Richard Paul, Ernest Haeussler</td>
<td>2/e</td>
<td>1983</td>
</tr>
<tr>
<td>INTERMEDIATE ALGEBRA</td>
<td>Derek Bloomfield</td>
<td></td>
<td>1984</td>
</tr>
<tr>
<td>COMPUTABILITY</td>
<td>George J. Tourlakis</td>
<td></td>
<td>1983</td>
</tr>
</tbody>
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**TABLE OF CONTENTS**

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