Calendar of AMS Meetings

THIS CALENDAR lists all meetings which have been approved by the Council prior to the date this issue of Notices was sent to the 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 meetings to which no numbers have yet been assigned. Programs of the meetings will appear in the issues indicated below. First and supplementary announcements of the meetings will 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 headquarters' office of the Society. 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 for consideration for presentation at special sessions is usually three weeks earlier than that specified below. For additional information, consult the meeting announcements and the list of organizers of special sessions.

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<td>(AMS Centennial Celebration)</td>
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<td>(6th Annual Meeting)</td>
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* Preregistration/Housing deadline is June 1.

** Preregistration/Housing deadline is November 6.

DEADLINES


Other Events Sponsored by the Society


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 at the back of every issue of Notices of the American Mathematical Society. Send change of address forms to the Society at Post Office Box 6248, Providence, Rl 02940.

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Members are strongly urged to notify the Society themselves of address changes, since reliance on the postal service change-of-address forms is liable to cause delays in processing such requests in the AMS office.
Noctes
of the American Mathematical Society

Volume 34, Number 4, June 1987

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The NSF Advisory Committee for the Mathematical Sciences met with the officers of the Division of Mathematical Sciences from April 6–7 to provide input into future directions at the NSF. Erich Bloch also participated in the meeting and forcefully presented his views. Page 603.

The Annual Reports to the Members from the Secretary, the Executive Director, and the Treasurer of the AMS review the activities of the Society during the past year. Page 608.

The Council of the AMS has formulated plans for a referendum on the issues concerning federal funding of mathematics. Page 615.

Commentary on Defense Funding is a new section of the Notices set aside by the Council to provide a forum for people to express their views on the funding issue. Statements by Edward J. Wegman, Seymour Parter, and James Glimm appear in this section. Page 616.

Leslie Lamport, as guest writer for Richard Palais' column on text processing, addresses the question “Document Production: Visual or Logical?” Page 621.

Kenneth Hoffman, in his Washington Outlook column, expresses the gratitude of the mathematical community for the excellent work of Frank Gilfeather, John Polking, and John Thorpe during their tours of duty in Washington. Page 625.

AMS Postdoctoral Research Fellowships are awarded to Richard Hain and Bill Jacob. Page 626.

NSF Graduate Fellowships are announced, with thirty-seven awards in mathematics and thirty-four awards in computer science. Page 631.

The meeting on April 6-7 of the National Science Foundation Advisory Committee for the Mathematical Sciences was enlivened by the appearance of NSF director Erich Bloch. At one point, Bloch remarked that the NSF’s Division of Mathematical Sciences (DMS) had received significant increases over the last few years and challenged the mathematical community to justify support of mathematical research in terms of its contributions to science and to the nation.

Bloch’s remarks came after the committee heard the presentation on the planning environment at the NSF by Sandra Toye, NSF Controller, who commented that mathematics had “done well” in the last few years and that other NSF disciplinary divisions would have liked to have had the DMS’s double-digit increases. Both comments drew the response from the committee that, as the David Report (Renewing U. S. Mathematics: Critical Resource for the Future) documented, mathematics research has been underfunded in the past and is only now beginning to catch up with other disciplines. To this retort Bloch replied that the government has a “selfish interest” in supporting mathematics research, not an “obligation” to it, so low funding levels in the past do not automatically put mathematics in line for increases. Mathematicians must prove the worth of their research, Bloch said, and if they do, “I’m with you, if not, I’m against you.” This justification must be made every year, “over and over again,” not just once in a while. Bloch may have been referring obliquely to the David Report, which he has said he wants updated.

Bloch’s comments are indicative of a new climate at the NSF in which scientific research is viewed as a means of boosting the nation’s economic strength. Indeed, it was by arguing that science is good for the economy that Bloch obtained presidential support for his efforts to double the NSF budget by 1992. Bloch has distilled his ideas into three initiatives for fiscal year 1988: developing human resources and broadening participation in science and engineering; establishing interdisciplinary science and technology centers; and building and improving the NSF’s disciplinary programs. These initiatives formed the focus of the committee’s discussion during its
1 1/2 hours with Bloch, as well as during the rest of the two-day meeting.

Bloch spent most of his time with the committee talking about the initiatives, listening to comments, and responding to questions. In speaking about the proposed research centers, Bloch said that the proposals would be subject to joint review conducted by the relevant NSF directorates. He also said that the form the centers will take is flexible and should suit the needs of the center’s research focus. On the subject of the human resources initiative, Bloch noted that the NSF does not have an accurate assessment of how well its human resources programs are operating and that, too often, programs were put together with insufficient planning and disbanded when new programs came along. He called for a “consistent, persistent” approach, specifically noting the important role that mathematics plays in precollege and college education.

The committee members described some of their ideas, such as holding CBMS (Conference Board of the Mathematical Sciences) conferences at minority institutions, giving small travel grants to minorities and women, and establishing an initiative to stimulate interactions between mathematics and biology. Bloch listened carefully to the ideas and appeared very open-minded. He called for the mathematical community to come forward with any ideas it has and promised they would receive full consideration.

At one point, someone asked Bloch the question that was probably at the back of every committee member’s mind: is there some assurance that the DMS’s budget will be doubled along with the NSF’s? Bloch said no, he hadn’t decided on what increase the DMS should receive. “And even if I had,” he said good-naturedly, “I wouldn’t tell you.” Just before leaving, Bloch was asked how certain he felt that the NSF budget would be doubled. On this point Bloch was conservative but optimistic: he said that it may not happen in five years, but may take six to seven years. He pointed out one of the unwritten rules in government funding matters: “If you don’t ask, you don’t get anything.”

Bloch’s appearance was one of the meeting’s highlights, but during the rest of the meeting the committee discussed many important issues facing the mathematics community in the new climate at the NSF. In addition, there were several presentations by NSF program officers and the presentation by NSF Controller Toyo.

Paul Swarztrauber, the new Director of the DMS’s Computational Mathematics program, spoke to the committee about the program. Its scientific goals are to use the computer as a tool to solve problems and gain theoretical insight in all areas of mathematics, and to increase the speed and accuracy of computations. To achieve these goals, the program supports hardware acquisition (such as workstations and superminicomputers) and software development, in addition to basic research. Swarztrauber said that this year, with a $3 million budget including $0.5 million for hardware, he had received forty-six proposals totaling $12 million. The proposals ranged in budget up to $1.4 million and in size from two to twelve investigators. He showed the committee an excerpt from a review of one of the larger proposals in which the reviewer deemed the proposed research excellent, but was uneasy about the project’s cost. The reviewer expressed concern that such a large structure would continually need large amounts of money, but nonetheless was convinced of the proposal’s scientific merit and recommended full support of the project.

Much of the committee’s discussion centered on a draft document entitled “Strategic Plan for the DMS.” The document provides guidelines for growth in DMS programs and for the establishment of new programs. Speaking about the document, DMS Director John Polking said that the document was based on ideas “coming from the top”—specifically, from Bloch’s three initiatives for fiscal year 1988. Polking made the point that mathematics must “maximize its position” with respect to the three initiatives.

One topic that elicited much discussion was Bloch’s initiative for establishing interdisciplinary research centers. The discussion proceeded on the assumption that the centers should not be established at the expense of the traditional mode of supporting individuals. The committee discussed ways that the mathematics community could formulate its needs in the context of centers and benefit from the initiative. Because this idea is relatively new to the community, the committee felt the need to discuss general frameworks for the centers, although a few specific ideas for centers were offered, such as a center in statistical science. While the committee appeared to be approaching the subject with a cautiousness that stemmed from unfamiliarity, some committee members and NSF officers noted a greater acceptance within the committee of the idea of centers than in previous discussions.

Polking listed five characteristics that the research centers in mathematics must have:

- a broad mathematical focus;
- an interdisciplinary nature;
- strong university ties;
- training for postdocs and students;
- industrial participation.

The committee distinguished between a center and a group: the latter would involve fewer researchers and have a narrower focus. The DMS foresees the establishment of two to three centers and a larger number of groups. The groups may simply consist of the expansion of existing interchanges or reorganization to achieve cooperative efforts that already exist. Education is tied to the groups and centers by what Polking terms “vertical integration” in which the education of young people and the
training of high school and college teachers are integrated into the research.

Andrej Manitius, Program Director for Applied Mathematics, spoke to the committee about an innovative initiative entitled "Innovative Interdisciplinary Program." It was part of a more general initiative which is proposed in the strategic planning document and would promote interactions and knowledge transfer between mathematics and other fields. Manitius's ideas are based on, but not confined to, some recent fruitful applications of mathematicians to biology, such as Charles Peskin's artificial heart valve modeling and connections between DNA and knot theory. Manitius emphasized that recent developments in materials and knowledge about the NSF's Engineering Education Directorate, speak to the committee about the NSF's Engineering Development and Education (SEE) Directorate, which seems to be more effective for mathematicians than large centers. The committee decided that the NSF director was most important. Manitius replied that the education and human resources committee members and NSF officials expressed doubt about the success of such efforts in the mathematics community. One committee member said that mathematicians had "abandoned" education, and others noted that the problem lay in the system for tenure evaluation, where research, not teaching, is recognized and rewarded.

As Controller of the NSF, Sandra Toye attends many congressional appropriations hearings and therefore understands shifting congressional priorities, as well as the thinking of the upper echelons of the NSF. One committee member asked Toye which of the three initiatives she thought would be the most important. One might expect her answer to be research centers, because they have received so much attention lately. But Toye replied that the education and human resources initiative was the likeliest of Bloch's initiatives to grow and continue to be emphasized. She gave three reasons: it is "politically important," Bloch is "serious" about it, and the National Science...
Board (the policy-making arm of the NSF) is “adamant” about it.

Central to the human resources initiative is the need to encourage minorities and women to pursue careers in science and engineering. At the meeting, DMS Deputy Director Judith Sunley described the various programs available specifically for minorities and women. The committee agreed that the problem of encouraging minorities in mathematics begins in elementary school. Several suggestions were offered, such as having mathematicians speak to PTA groups about the importance of mathematics in early education, conducting parent awareness courses, and summer and weekend programs in mathematics for high school students. Sunley reminded the committee that investigators can request a supplement to support a high school student on an NSF grant and that a new option in the Minority Graduate Fellowship Program provides a monetary “reward” to college departments that have produced a fellowship awardee.

The committee discussed at length the difficulties of those mathematicians who, discouraged because they did not receive NSF support, continue to produce high quality research, but no longer apply for grants. In this sense, the needs of mathematicians are quite different from scientists who require equipment to do their research and therefore would not be able to work without a grant. Nonetheless, mathematicians continue to need the recognition and encouragement that NSF grants provide. As one committee member pointed out, however, those mathematicians who have not received funding in the last five years probably never will.

The committee noted some problems with targeting these mathematicians with a special program. First, a program for those who are seven to eight years beyond the Ph.D. would not exclude those researchers who have been funded all along and who would probably be funded anyway. Second, a program that stipulates that a participant must not have had an NSF grant in the last five years was seen by the committee and DMS officers as a circumvention of the peer review system. However, it was noted that if the DMS can increase the number of grants it gives, perhaps these people would be more encouraged to apply. Also, some mathematicians would be supported by centers and groups funded outside the DMS core budget, thereby freeing up grant money for others.

The committee also discussed the difficulties of those mathematicians who have quit doing research altogether. Some members pointed out that research centers and groups would provide intellectual stimuli that would encourage these mathematicians to see new possibilities for research. Also, it was suggested that researchers currently receiving grants could be encouraged to involve other researchers, especially those who are isolated because they are the only ones in their field at their institution, or because their institution is geared toward teaching and not research. Small travel grants to attend conferences were deemed beneficial in encouraging such mathematicians to resume research, but Sunley said that the DMS probably could not administer such grants in a cost-effective manner.

During the discussion, there were some suggestions given for revisions in the draft strategy plan. Once these revisions are incorporated, the document will become part of a long-range plan of the Mathematical and Physical Sciences directorate.

Near the end of the meeting, the committee elected Alan Newell of the University of Arizona the new chairman. With so many changes taking place at the NSF, the role of this committee and of its chairman will become especially important.
SEARCH FOR AN EXECUTIVE DIRECTOR
for the
AMERICAN MATHEMATICAL SOCIETY

The post of Executive Director of the American Mathematical Society will become vacant on a date to be established in 1988 upon the retirement of William J. LeVeque from that position. The Executive Director is employed by the Trustees of the Society, who now seek a replacement. Employment could begin at a date of mutual convenience in 1988 and might include overlap with the term of the incumbent, though this is not a requirement. The central office of the Society is in Providence, R.I.

The duties of the position are summarized in Article VI of the bylaws of the Society as follows:

Section 1. There shall be an Executive Director who shall be a paid employee of the Society. He shall have charge of the central office of the Society, and he shall be responsible for the general administration of the affairs of the Society in accordance with the policies that are set by the Board of Trustees and by the Council.

Section 2. The Executive Director shall be appointed by the Board of Trustees with the consent of the Council. The terms and conditions of his employment shall be fixed by the Board of Trustees.

Section 3. The Executive Director shall work under the immediate direction of a committee consisting of the President, the Secretary, and the Treasurer, of which the President shall be chairman ex officio. The Executive Director shall attend meetings of the Board of Trustees, the Council, and the Executive Committee, but he shall not be a member of any of these bodies. He shall be a voting member of the Committee to Monitor Problems in Communication but shall not be its chairman.

Note: In the above statement, “he” is the sexless third person singular pronoun, used to avoid the awkwardness of repeated “he or she” or the barbarism “he/she.”

The purpose of the Society is described in this quotation from the charter:

The particular business and objects of the Society are the furtherance of the interests of mathematical scholarship and research.

The Society accomplishes its purpose through meetings and conferences and through publication. There is a diversity of other activity.

The annual budget of the Society exceeds thirteen million dollars, about one fifth being in the general fund and four fifths in the publication fund. There are about 150 employees in Providence and 75 in Ann Arbor. Mathematical Reviews is a semi-autonomous operation in Ann Arbor under the direction of the Executive Editor.

There are about eight general meetings per year and as many as twelve to fifteen specialized conferences.

The Society publishes at least sixteen journals of various kinds. It publishes about a dozen series of books. All of the operations, except for the printing of a couple of journals with very large print runs, are done in-house.

Both the office operations and the publication program are highly computerized.

Candidates should have a Ph.D. in mathematics (or the equivalent), published research beyond the Ph.D., and significant administrative experience. Desirable qualifications include experience in mathematical publication, fiscal management, and computer utilization.

A search committee, with Frederick W. Gehring as Chairman, has been formed to seek and review candidates. Persons who wish to be considered or to make a nomination should provide supporting documentation to

Professor F. W. Gehring
Department of Mathematics
University of Michigan
Ann Arbor, MI 48109

before 1 September 1987 to receive full consideration.
Annual Report of the Secretary

Meetings

The Society had a successful set of meetings in 1986. The Annual meeting of 1986 was held in New Orleans with Colloquium Lectures by Shing-Tung Yau, Gibbs Lecture by L. E. Scriven, six invited hour addresses, and 669 shorter talks in seventeen special sessions and sessions for contributed papers. There were special invited addresses by Erich Bloch, Director of the National Science Foundation, and by George F. Carrier. The meeting was joint with the Mathematical Association of America, which sponsored three addresses with the Society and offered the Retiring Presidential Address of Ivan Niven and eight other addresses of its own as well as shorter talks.

A feature of the Annual and Summer meetings is the award of prizes. At the New Orleans meeting, the Veblen Prize in geometry and topology was awarded to Michael H. Freedman for his paper *The topology of four-dimensional manifolds.*

The Steele prizes of 1986 were not presented until January 1987 because of the absence of the usual Summer meeting. There were three of them. The 1986 Steele Prize for Expository Writing went to Donald E. Knuth for his books (three volumes) titled *The art of computer programming.* The 1986 Steele Prize for a Fundamental Paper was awarded to Rudolf E. Kalman for three papers on systems and control theory. The 1986 Steele Career Prize was presented to Saunders Mac Lane for his many contributions to algebra and topology.

There were five regional meetings at which there was a total of seventeen invited hour speakers and 451 shorter talks in seventeen special sessions and sessions for contributed papers.

The International Congress of Mathematicians in Berkeley in August displaced the usual Summer meeting. It was a highly satisfactory Congress, whose extent and merits will not be detailed here. Mathematicians in North America found it convenient to have the Congress close at hand and welcomed the opportunity to be hosts rather than guests. The Congress was in the United States at the invitation of the National Academy of Sciences. It was operated by a separate corporation that contracted with the Society for a variety of services. Moreover, the Society agreed to support the Congress financially by paying the deficit, if any. Although the books are not closed, the deficit is negligible. The exact amount of the deficit will not be known until the sale of the Proceedings of the Congress.

The Society offered a Symposium on Some Mathematical Questions in Biology at the meeting of the American Association for the Advancement of Science in May in Philadelphia. The topic was Modeling Circadian Rhythms.

The Summer Research Conferences, held jointly with the Institute for Mathematical Statistics and the Society for Industrial and Applied Mathematics, consisted of five one-week conferences and one two-week conference. The site was Santa Cruz. The program was curtailed from the more usual ten conferences to allow for the ICM.

There was a Summer Institute of three weeks duration, in Arcata, on Finite Groups and Related Topics.

Publication


The Society now has a new acquisition editor, namely Edwin F. Beschler, who joins the staff after a career in commercial publishing.

An event that did not take place should be remarked. The Society has been studying the possibility of a merger of *Mathematical Reviews and Zentralblatt für Mathematik* since 1983. Although initially the idea looked promising and was supported in principle by the Council, it was finally decided that it was not a realistic venture. The Executive Committee and the Board of Trustees reached the position in November 1986 that they could not support the plan, and on their recommendation the Council of January 1987 withdrew the endorsement.

Membership Services

In 1983, the Board of Trustees instituted a handling fee for mailing the *Combined Membership List (CML)* to those AMS members who requested it, effective in 1984. The Board rescinded this policy in November, and the CML will again be distributed at no charge in 1988. (It is distributed by the MAA in odd-numbered years.)

The CML of 1986 was able to carry electronic addresses for the first time. See the April 1987 Notices, page 497, for related information.

The Council approved proposals to create a new category of membership, the life member, and to allow members to pay dues for several years ahead at the current rate. (For details, see the June 1986 Notices, page 500.)

Society Business

The Society had a good year financially. The operating fund balance now stands at about
$2,400,000, even after restoring a portion of the reserves that were depleted in recent years. The Treasurer will have more to say about the financial picture.

Life membership was reinstated after a lapse of nearly fifty years. This time, it exists only for members at least of age 62 with twenty years of Society membership.

A substantial fraction of the membership expressed a preference for a dues reduction in place of receiving the Bulletin. The mechanics of the operation, such as the amount of dues reduction and the necessary change in the bylaws, are being developed.

The year 1986 saw the beginning of a reduction in the size of the Council, which will shrink from about 60 to about 35 by 1991 as an amendment to the bylaws takes effect.

The Society continues its Research Fellowship program, based on contributions and matching funds from the Society. The winner in 1986 was Dinakar Ramakrishnan.

The Council nominated Robert M. Fossum as the candidate for Secretary in the uncontested election of 1988. Should all go as planned, he will become Secretary on 1 January 1989.

Everett Pitcher

Annual Report of the Executive Director

The Society once again enjoyed a splendid year, financially speaking, in 1986. As a result, steady progress is being made toward the Trustees’ goal of establishing a reserve of about one year’s operating budget. The challenge is to achieve an annual surplus while keeping the prices of our books and journals low, meeting production and membership costs, and carrying on all the activities of the Society that produce no income. There are three principal aspects to the strategy for doing this: invest in equipment and technology that will keep costs down over the long pull, expand the publication program modestly to create a broader income base, and maintain a well-qualified staff committed simultaneously to excellence and frugality. I am confident that in future years this strategy will have yielded a Society financially strong enough to weather difficult times and at the same time flexible enough to meet new technological or societal demands. The sections following are intended not only to provide a report on individual activities that supplements the Secretary’s Report, above, but to reveal how this strategy was being carried out in 1986.

Meetings and Conferences

The base rate for registration fees at the Joint Annual and Summer meetings was established in a contract between the Society and the MAA in 1979, at a level intended to produce enough income to break even, approximately, on the two meetings each year. The base rate is indexed to the cost of living, and so goes up slowly. The costs of planning and running the two meetings are nearly equal, even though attendance and registration income are much smaller in the summer. As a result, the annual meeting ordinarily yields a small surplus and the summer meeting a deficit. The total net income was positive in 1986, for the first time in memory, because there was no summer meeting. (The usual net deficit might best be thought of as supported by members’ dues; each member pays something for the possibility of attending meetings, even if he or she chooses not to do so.)

Some other scientific societies include the price of the proceedings volume with the registration fee for a conference. We tried this out for a year or two but it proved to be quite unpopular, so in November the policy was rescinded.

In 1947, the Society initiated a series of Symposia in Applied Mathematics, and one was held almost every year until 1980. About 10 years after SIAM was formed (in 1952), the latter organization became a cosponsor of the series. Last August, SIAM withdrew from this activity, and an AMS committee was appointed in the fall to consider new ways in which the Society can best serve the special interests of applied mathematicians. These developments will not affect the annual Summer Seminar in Applied Mathematics and the Symposium in Mathematical Biology; the 1987 Seminar on Computational aspects of VLSI design with an emphasis on semi-conductor device simulation and the 1987 Symposium on Models in population biology have already been held, and planning began last year for the corresponding 1988 conferences.

The Centennial of the Society will be observed in 1988. The main event will unquestionably be the Centennial Meeting itself, in Providence, and a program committee chaired by E. Pitcher began its work in earnest in 1986.

MR and Related Products

This part of the report deals with activities at Mathematical Reviews during 1986 and the first part of 1987, and was prepared principally by R. G. Bartle, the Executive Editor.

In January 1987, the cumulative author and subject indexes for the 1980-1984 issues of MR were published. This twelve-volume set of indexes collects together full bibliographic information about the approximately 200,000 books and papers in the mathematical literature that were reviewed during this five-year period, and greatly facilitates searching this recent literature. This set of indexes is an indispensable tool for every mathematical research library.
Early 1987 saw the publication of the first two compilations of subject indexes of all the items in probability theory and in statistics that were reviewed in MR from 1940-1984. These subject indexes provide a compact and inexpensive tool for locating information about the authors and titles of all articles and books in these two areas over this span of forty-five years, and should be of great use to researchers in probability theory and statistics. Additional subject indexes for specific areas will be published in the future.

The first six issues of MR for 1987 are running about 20% larger than the corresponding issues of 1986. While a part of that increase is due to somewhat more material being published, most of it is due to an attempt by MR to streamline its production processes so that MR will be more timely. One of the reasons for the increase in the literature is the growing number of conferences that are being held in the mathematical areas and for which proceedings are published. It is the policy of MR to review only those articles in conference proceedings that are in final form and that will not be published (possibly in fuller form) elsewhere. Most of the items that are not in final form will be listed in Current Mathematical Publications (CMP) and will be fully classified and listed in MR indexes, but will not be reviewed. That makes CMP an important acquisition for every mathematics library, so that scholars will be alerted to the existence of these somewhat ephemeral conference proceedings articles as well as the items that will be fully reviewed. In response to several requests, the Tables of Contents of the journals that are published in CMP have been moved to the front of the issues, so that they will be more conspicuous.

During the past eighteen months, Math\Sci—the electronic version of MR—has increased dramatically in scope, timeliness, and usefulness. All current entries from CMP are now added to the file, so that Math\Sci users now have access to complete bibliographic information about items received by MR shortly after their receipt—sometimes even before the publication of the items in the original journal. In addition, the files are being extended back to 1959, so that complete bibliographic information will soon be available in Math\Sci for all items in MR from 1959 to the present (even the near future). Also added were the records from the Current Index to Statistics (CIS), covering statistics items beyond the scope of MR from 1980 to the present. In 1986, the program Math\Sci\TeX was made available; this program makes it possible for a user to download an item (1985 or later) from Math\Sci to his or her personal computer and obtain a version that is complete with all mathematical symbols. We urge all mathematicians to discover how useful Math\Sci can be for them in their bibliographic searches.

Despite the fact that MR and Zeitschriften für Mathematik (Zbl) after long discussion did not merge (see the report of the Secretary), they continue to cooperate while they remain separate entities. For example, the editors of the two reviewing journals are just starting the revision of the 1980 Mathematics Subject Classification, which is the classification system presently used by both journals. The new revision must be completed by the end of 1988 in order for it to be used in CMP beginning 1989 and MR and Zbl beginning 1990. We would welcome any comments and suggestions, which we will share with the Zbl editors.

Publications

The Society’s all-time best seller is the Russian
English Dictionary of the Mathematical Sciences
by A. J. Lohwater. A quarter-century having passed since its publication, the word list has many of the terms current in research in pure mathematics, and is even more deficient in some areas of application such as computer science. Without another source of funding in sight, the Executive Committee and Board of Trustees agreed to spend up to $100,000 to prepare and publish a new edition. The work will be under the capable direction of R. P. Boas, but of course one person cannot know everything in this kind of work, and the quality of the final product will depend in part on the amount of expertise provided by volunteers in the mathematical community. If you are aware of words, phrases, or meanings that are lacking in the present dictionary, or if you are reasonably fluent in Russian and are willing to help in this important endeavor, please get in touch with Professor Boas at Northwestern University.

The writer attended the Beijing International Book Fair in September in order to continue discussions initiated in December 1985, with heads of Chinese publishing houses. Arranging to translate Chinese books is complicated by the fact that there is no copyright law in China and no international agreement covering Chinese publications. In principle, we could reprint a Chinese book or publish a translation of it without obtaining permission or paying royalties, but of course we would not do so. Conditions were agreed to in September which have since led to firm contracts with all the major mathematical publishing houses in China, and translation of the first two books under these contracts will soon commence.

The official first edition of Michael Spivak’s Joy of \TeX was published in 1986, following editions -2, -1 and 0 which had been distributed earlier for testing purposes. This highly readable book is the instruction manual for the macro package, \AMS-\TeX, which the Society commissioned Spivak to prepare in order to make it easier for
Activities and Changes in the AMS Offices

John L. Selfridge left Mathematical Reviews in July 1986, after eight years of distinguished service as its Executive Editor, to return to Northern Illinois University as chairman of the mathematics department. During his term, the size of MR grew from about 32,500 reviews to somewhat over 40,000 reviews per year, a very considerable backlog was eliminated, the collection of author and subject indexes from 1940 on was completed, the online version of MR (now called Math\Sci) was developed, and the use of \TeX was implemented. Many of these changes were made possible by the very substantial computerization that has taken place in both the Providence and Ann Arbor offices in recent years. We in the Society offices are grateful to John for his dedicated service and wish him well in his future endeavors.

During 1986, two long-time Providence department heads retired. Marjorie Cummings came to the AMS in 1966, and had been head of the Membership & Sales department for 11 years before becoming Director of the Production & Distribution division in 1977. Because of a reorganization following her retirement in October, she was not replaced.

Phoebe Murdock was known to many habitual AMS meeting goers as the person in charge of the book exhibits; she had also been head of the Marketing group. She had been with the Society since 1967 and retired in November.

Because of the decision by Digital Equipment to discontinue the DEC-20 line of computers, it was necessary to begin moving the entire AMS system over to VAXs. A VAX 8600 was purchased in late 1985 and was brought into operation during 1986, communicating with the DEC-20s through an Ethernet local area network. The principal use of the new machine has been the development of an entirely new database for membership and customer records; when this is complete, along with the associated order-fulfillment system, the Society will have a powerful, efficient, and flexible tool for carrying on the business side of its activities.

Similarly, the composition department in the Providence office, and the systems group in the MR office, continued to develop the Society’s facilities for using \TeX. Only one link in the chain was weak by the end of 1986—a fast typesetting machine which could produce \TeX output in a variety of fonts—and this was secured in early 1987. Many books and journals are produced in \TeX already, and the commercial typesetting system formerly used will gradually be replaced by \TeX for all purposes. (Essentially all composition and printing of AMS books and journals is done in the Providence office except for the printing of the Bulletin and Notices, which have large print runs, and Mathematical Reviews and CMP.)
which are partly composed in Ann Arbor and are printed by an outside firm.)

Commercial software had been purchased for handling preregistration and hotel reservations at meetings, but it had to be largely rewritten to cope with the special needs of the AMS. Also, the computer program which does the matching of employers and applicants at the Employment Register needed an almost complete overhaul, after about twenty years of patching and repatching. The new programs were used for the first time at the Laramie and San Antonio meetings.

W. J. LeVeque

Report of the Treasurer

I. Introduction

During the first five years of this decade (1980-1984), the Society incurred losses totaling $2,548,000. At December 31, 1984, the Society's fund balances (excluding endowments) had declined to $1,688,000, or 17.7% of the Society's total assets (excluding endowments) of $9,555,000. At December 31, 1979, fund balances were about 44% of total assets (excluding endowments) of $6,891,000. Since 1984, the Society has experienced two very good years of earnings, and at the end of 1986, the Society's fund balances (excluding endowments) had increased to $5,417,000, or 34.8% of total assets (excluding endowments). Included in these fund balances is the Future Operations Fund. The Long Range Planning Committee and the Board of Trustees have recommended that the Society build this fund to an amount equal to one year's operating budget. At December 31, 1986, the Future Operations Fund was $2,778,000, about 21% of next year's budget.

The recent improvement in the Society's financial health can be only partially attributed to cost cutting and fiscal restraint. The Society's finances are very greatly affected by the general economy, library budgets, and even foreign exchange rates. These and other factors are very difficult to predict, and the Society often finds itself in the position of reacting to these factors. The Future Operations Fund is an attempt to prepare for the inevitable deterioration in these environmental factors.

II. Summary Financial Statements

The Treasurer this year again presents to the membership summary financial statements of the Society. A copy of the Treasurer's Report, as submitted to the Trustees and the Council, will be sent from the Providence Office to any member who requests it from the Treasurer. The Treasurer will be happy to answer any questions members may wish to put to him concerning the financial affairs of the Society.

Summary Balance Sheet
December 31, 1986
(Thousands of dollars)

<table>
<thead>
<tr>
<th>Assets</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash and temporary investments</td>
<td>$3,545</td>
</tr>
<tr>
<td>Other short-term investments</td>
<td>2,010</td>
</tr>
<tr>
<td>Receivables—members and others (less</td>
<td>37</td>
</tr>
<tr>
<td>allowance for doubtful accounts)</td>
<td></td>
</tr>
<tr>
<td>Prepaid expenses and deposits</td>
<td>64</td>
</tr>
<tr>
<td>Deferred prepublication costs</td>
<td></td>
</tr>
<tr>
<td>Inventory of completed books and</td>
<td>70</td>
</tr>
<tr>
<td>back volumes of journals</td>
<td></td>
</tr>
<tr>
<td>Property and equipment (less</td>
<td></td>
</tr>
<tr>
<td>accumulated depreciation)</td>
<td></td>
</tr>
<tr>
<td>Total operating assets</td>
<td>4,776</td>
</tr>
<tr>
<td>Investments—at cost (market value—$5,235)</td>
<td></td>
</tr>
<tr>
<td>Total assets</td>
<td>12,559</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liabilities and fund balances</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts payable</td>
<td>$65</td>
</tr>
<tr>
<td>Subscriptions, dues, and other revenues</td>
<td>7,433</td>
</tr>
<tr>
<td>received in advance</td>
<td></td>
</tr>
<tr>
<td>Other miscellaneous liabilities</td>
<td>96</td>
</tr>
<tr>
<td>Long-term debt (mortgage on building)</td>
<td>1,267</td>
</tr>
<tr>
<td>Total liabilities</td>
<td>10,146</td>
</tr>
<tr>
<td>Operating fund balance</td>
<td>2,411</td>
</tr>
<tr>
<td>Total operating funds</td>
<td>12,559</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Invested fund balances:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Endowment funds</td>
<td></td>
</tr>
<tr>
<td>The Endowment Fund</td>
<td>100</td>
</tr>
<tr>
<td>Robert Henderson</td>
<td>58</td>
</tr>
<tr>
<td>Joseph Fels Ritt</td>
<td>21</td>
</tr>
<tr>
<td>Prize funds</td>
<td>29</td>
</tr>
<tr>
<td>Eliakim Hastings Moore</td>
<td>3</td>
</tr>
<tr>
<td>Undistributed net gains on investment</td>
<td>911</td>
</tr>
<tr>
<td>transactions</td>
<td></td>
</tr>
<tr>
<td>Funds other than endowments</td>
<td></td>
</tr>
<tr>
<td>Future operations</td>
<td>277</td>
</tr>
<tr>
<td>Friends of Mathematics</td>
<td>121</td>
</tr>
<tr>
<td>Other</td>
<td>100</td>
</tr>
<tr>
<td>Total liabilities and fund balances</td>
<td>17,351</td>
</tr>
</tbody>
</table>

Summary Statement of Activity
For the Year Ended December 31, 1986
(Dollars in thousands)

<table>
<thead>
<tr>
<th>Revenue</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Journals</td>
<td>$7,958</td>
</tr>
<tr>
<td>Books</td>
<td>1,390</td>
</tr>
<tr>
<td>Dues</td>
<td>1,184</td>
</tr>
<tr>
<td>Membership Activities</td>
<td>151</td>
</tr>
<tr>
<td>Meetings</td>
<td>241</td>
</tr>
<tr>
<td>Grants and Contracts</td>
<td>1,288</td>
</tr>
<tr>
<td>Investment Income</td>
<td>566</td>
</tr>
<tr>
<td>Other</td>
<td>226</td>
</tr>
<tr>
<td>Total revenue</td>
<td>$13,006</td>
</tr>
</tbody>
</table>

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III. Operations

I now turn to a discussion of the Society's 1986 operations.

Journals. Journals provide the largest fraction of the Society's revenues and expenses. In the past, journals have operated at a net loss. During 1985 and 1986, journals operated in the black and provided a very significant portion of the Society's 1986 surplus (the excess of revenues over expenses in the summary financial statements above). This improvement is the result of a decrease in the rate of attrition in subscribers and a variety of cost-cutting procedures implemented by Society management.

Books. Included in this category are not only books (monographs or collections of articles) but review volumes and indexes to journals. Books, exclusive of the latter, continue to be financially sound, and selling prices of AMS books compare very favorably with other mathematical books. Over the past few years, the book program has increased at a rate of about 20% each year. The resulting efficiencies have allowed the prices of the books to be kept reasonably low.

Review volumes and indexes are very costly to produce, resulting in high prices. Each such planned publication is scrutinized very carefully from both scientific and financial perspectives, and prices are set accordingly. In 1986, indexes and review volumes together broke even. They had a small loss in 1985.

Dues, Membership Activities, and Membership Records. The Society has about 480 institutional members and 20,000 individual members. Of the latter, about 6,000 pay no dues because they are student nominees, emeritus members, or reviewers without convertible currency. Individual member dues are two-tiered to provide some relief to lower paid members. Institutional published by authors employed by the institution. Increases in dues for individual members are set annually by a cost-of-living index.

Membership activities include such projects as the Employment Register and the Mathematical Sciences Professional Directory. In total, the activities operate at a deficit, which is considered to be supported by dues. Other costs which can be considered to be covered by dues include the cost of maintaining membership records, the deficits of Abstracts, Bulletin, EIMS, and Notices, deficits from meetings, and the AMS support of the Joint Policy Board on Mathematics.

Meetings. For the first time in many years, meetings did not operate at a deficit. The usual summer meeting was not held in 1986 because the International Congress of Mathematicians was held in the United States. I expect that meetings will again operate at a deficit in 1987.

Grants and Contracts. The amount of money available from the federal government has declined substantially over the years. Currently, support is mainly for travel and subsistence for participants in research conferences, institutes, and seminars, plus the Society's cost in preparing and running these conferences. The money received from government agencies is reimbursement only, with no profit to the AMS. The Society also has contracts to perform services for other nonprofit organizations, and this helps to recover some fixed costs.

Other Revenues and Expenses. The principal components of other revenues and expenses are MathSci (by far the single largest item), TeX related products, and the AMS support of the Joint Policy Board for Mathematics.

IV. Assets and Liabilities

So far, this report has dealt with sources of revenue and applications of expense. Another aspect of the Society's finances is what it owns and owes, or its assets and liabilities, which are reported above in the Summary Balance Sheet. The Society maintains its accounts in fund groups. The operating funds include membership and publications activities; the invested funds include the International Congress of Mathematicians was held in the United States. I expect that meetings will again operate at a deficit in 1987.

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The Society's fiscal year coincides with the period covered by subscriptions and dues. Since dues and subscriptions are generally received in advance, the Society reports a large balance of cash and temporary investments on its fiscal year-end, December 31. This amounted to about $5,500,000 for 1986. The recorded liability for the revenues received in advance was about $7,400,000 on the same date. The difference can be thought of as having been invested in the Society's other assets. Effectively, the Society borrows from its
subscribers to finance current operations. This is a common practice in the publishing industry and allows the Society to maintain a very low amount of bank debt.

The Society's property, plant, and equipment includes land, buildings, and improvements, and office furniture, equipment, and software. The Society also owns a small amount of transportation equipment. The land, buildings, and improvements include the Society's headquarters building in Providence and the Mathematical Reviews offices in Ann Arbor. The appraised value of these facilities currently exceeds $3,000,000. The largest part of the Society's office equipment is an investment in computer facilities.

The Society's Providence land and building secure a mortgage note amounting to $1,368,000 at year-end. During the first quarter of 1987, approximately $330,000 of the balance was paid back.

Franklin P. Peterson

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Council Plan for a Referendum

There are two motions [1] pending before the Society. The Committee on Science Policy made recommendations [2] to the Council concerning them. See the references below.

The Council of 25 April 1987 considered the recommendations and adopted the following plan.

1. The Council instructs the Managing Editor of the Notices and the Chairman of the Notices Editorial Committee to open its pages for comment related to two motions considered at the Business Meeting of 22 January 1987.

2. The Council instructs the officers of the AMS to hold a mail ballot of the membership, after the January 1988 annual meeting but before February 1988, on the substance of the two motions concerning issues of federal funding of research in mathematics.

3. The Council, at its meeting of 4 August 1987, will adopt the specific wording of the motions to appear on the mail ballot.

The President is requested to distribute drafts of these motions as early as possible to the Council for comment and criticism.

4. The Committee on Science Policy is requested to submit to the May meeting of the Executive Committee and Board of Trustees (ECBT) its suggested wording for these motions. Other interested groups are also encouraged to submit possible wording to that ECBT meeting.

5. The Council of 4 August 1987 should decide whether to recommend that the Business Meeting table the two motions before it in view of the upcoming mail ballot.

6. The Notices of June 1987 should include a prominent announcement of the plans above.

This article constitutes compliance with item 6. Compliance with item 1 has been initiated.

The references are:


Bethlehem, Pennsylvania

Everett Pitcher
Secretary
Commentary on Defense Funding

As recommended by the Committee on Science Policy (see Notices, April 1987, page 448), this section of the Notices has been instituted to provide a forum through which the mathematical community may comment on the two motions presented at the January 1987 AMS Business Meeting (see Notices, January 1987, page 76, and February 1987, pages 398–399).

Items to be considered for this section should be sent to the Managing Editor of Notices, Commentary on Defense Funding, American Mathematical Society, P.O. Box 6248, Providence, RI 02940 and should be limited to approximately 1,000 words.

Edward J. Wegman
George Mason University

I read with particular interest the discussions contained in the Report of the Science Policy Committee, February 1987 Notices, pages 235-244. As a member of the American Mathematical Society, the recent past Head of the Mathematical Sciences Division at the Office of Naval Research, and the person who created the original computer and mathematical sciences efforts in the Innovative Science and Technology Office of the Strategic Defense Initiative Organization, I am perhaps in a unique position to comment on these matters. I would like to direct my discussion in three parts. I would like to comment first on the peer review and the National Science Foundation, second on the two motions regarding respectively, SDI and DOD, and finally on the prepared statements of Hyman Bass, Ettore Infante, Melvyn Nathanson, and Steven Weintraub found in the appendix.

1. Peer Review and the NSF. It seems clear to me that it is a virtual article of faith that the health of the mathematical sciences in the United States is tied to the peer review system and its implementation in the National Science Foundation. If this be the case, it is perhaps well to consider carefully the fundamental purpose of federal funding of academic research and its implications for the National Science Foundation. On the surface of it, the purpose must be to facilitate more and better research with the expectation, as Infante points out, that these investments will provide a return in terms of increasing the health, industriousness, and security of the nation. Does federal funding produce more research? The answer is probably not. A look at data on the number of papers published pre-World War II and post-World War II (when federal funding of academic research began) shows a relatively smooth transition with only the expected statistical fluctuation. There is thus relatively little evidence of significant increases in productivity of individuals. A secondary effect might be to enhance the infrastructure to encourage additional individuals to engage in the scientific enterprise and thus increase the total pool of individuals carrying on the scientific enterprise. There is probably more merit to this, although arguably the best and the brightest scientific talents are likely to have chosen these fields anyway with the concomitant conclusion that only marginal individuals are persuaded by the financial rewards. In any case, it certainly is no more than an uncritically accepted supposition that federal funding produces more research.

Does federal funding produce better research? This, of course, is the crux of the issue. It is argued that peer review subjects researchers to the intense scrutiny of their peers, and that only the best survive to be funded. Indeed, the peer review concept is revered almost as a holy grail. It could well be argued by outsiders that peer review is nothing more than an old boys club. It could be argued that those who are in the establishment obviously have a vested interest in maintaining their influence with the funding agency. It clearly is tempting, for example, for a topologist to prefer second-rate topology over first-rate statistics. In any case, it is clear that peer review tends to be conservative and thus as a system, has biases against the most innovative work. Let me also add that, as a member of the federal funding establishment for eight years, I have seen numerous instances of these effects apparent in peer review. These are not simply idealistic concerns but the realities of day to day human interactions. It is a tribute to the professional program managers at the agencies that such effects are minimized.

If more and better is not unequivocally the result of federal funding, what then is the purpose? I would argue that the primary purpose of federal funding is to shape the direction and kind of research that is done. Clearly, economic forces have shaped the growth of computer science and the expense of mathematics. Implicit in the arguments for more funding of mathematics is the recognition that this is so. If indeed this is the case, then it certainly can be argued that the federal government has a legitimate interest in shaping the directions of research for the good of all citizens. Simply put, federal funding of mathematics is not for the good of mathematicians, but for the good of all citizens who provide the monies for it. This clearly weakens the argument in favor of the NSF and its peer review system. Peer review tends to preserve the status quo rather than shaping new directions. It is my belief that the so-called mission agencies can make a much more cogent
case to Congress for federal funding of research
than the NSF simply because they are in a
stronger position to define concrete research goals.
It seems to me to be a far better strategy to
encourage support of mathematics in a variety
of agencies, rather than suggest the migration of
all monies to one agency, particularly, an agency
whose fundamental premises are vulnerable. It
seems to me that there is no substitute for
more focused programs within the NSF, for
this strengthens the case that can be made for
increased NSF funding of mathematics.

2. The Motions. I have devoted eight years
of my professional life to the proposition that the
mathematical sciences have a legitimate role to
play in the strengthening of the defense of the
United States. As to Motion 2 regarding the
increasing militarization of mathematics research,
it seems to me that there is precious little cause
for alarm. As I reckon it, DOD supplied 38.7% of
the federal funding in FY 1983 and 39.4% in
FY 1987. (This from the data in Table 1 of the
Voices article.) Indeed, this includes a major
new program from DARPA which implies that the
proportion of funding from ONR, AFOSR, and
ARO has slumped. Rather than there being alarm
about the increasing militarization, there should
be alarm about the decreasing militarization. I
am able to comment from first hand experience
that, while the total budget available for math­
ematics has remained constant, much of what
has been available has been directed towards core
mathematics, e.g., the programs in discrete math­
tematics and topological methods in chemistry at
the ONR and the finite mathematics program at
the AFOSR. This means that your colleagues in
applied mathematics and statistics have, in fact,
paid the price for growth in core mathematics. There has
been substantial erosion in the support for applied
mathematics and statistics.

As to Motion 1 regarding SDI, I have a
somewhat mixed reaction. When the SDI program
was originally announced (and incidentally when
I became involved), it was publicly described
as a five-year research program to examine the
feasibility of constructing and deploying such a
system. The popular press has, however,
portrayed SDI much more as a development effort
with the assumption that the research would be
successful and that deployment was a foregone
conclusion. This has never been my view. Serious
problems exist in the technical arena. The most
serious in my view are our inability to create
the massive amounts of fault tolerant computer
code necessary to implement the system and the
critical power conditioning in a space environment. By the latter, I mean ability
to switch on and convert forms of energy in a
vacuum where the only means of heat dissipation
is radiative transfer. In any case, I find little
sympathy for those who proclaim it cannot be
done so therefore we should not try. This seems
to me to be profoundly anti-intellectual. I would
rather argue, at least in the abstract, that we
should consider all the technical and philosophical
issues over a reasonable amount of time, and
then come to a carefully considered judgement. I
simply do not believe the issues are as clear-cut
as many portray them to be.

What is true is that the politicizing of Star
Wars has hardened perspectives. It has caused
many advocates of SDI to say, let's do it to prove
it can be done. The real danger of the whole affair
is that some ineffective system will be deployed
as an emotional response to criticism rather than
a decision to deploy or not deploy based on sound
technical and philosophical reasons. It seems to
me that if there are substantial misgivings, then
there is an obligation to embrace SDI and prove
unequivocally that it cannot be done. Math­
ematicians should, above all others, recognize
the danger in the logical leaps associated with
assuming that the obvious is true.

My own dilemma is this. Now that Star
Wars has been so politicized, is it possible to
achieve a decision based on sound technical and
philosophical reasons? I don't know. In any case,
I believe boycotts are ineffective. The surest way
to affect the direction of SDI is to be in dialogue
with the officials at SDI, and the surest way to be
ignored is to disengage with them totally.

3. The Statements. I find these to be an
interesting collection of remarks, most interesting,
perhaps, because of the absence of anyone directly
or indirectly connected with the military. I find
most sympathy with the statements of Ettore
Infante, who cogently dissects the arguments and
whose arguments are both sound and pragmatic,
and Melvyn B. Nathanson. I was particularly
struck by Nathanson's clear view of the funda­
mental role of federal funding in altering the
direction of research.

The statement of Hyman Bass starts off with
premises that I wholeheartedly endorse. He goes
on to describe what he calls the civilian mode
and the military mode of defense funding. My
only comment here is that all of what I saw as
a Program Director and as a Division Head at
ONR was in the civilian mode. It is, in fact,
the general policy of DOD that all basic research
be in the civilian mode. Thus, I
would be hard put to describe a setting in which
basic research would be funded in the military
mode. My biggest concern with Professor Bass's
statement is his remark, "Neither they (program
directors) nor other DOD personnel who manage
and understand science have much discretion or
influence on science policy..." This is simply
not consistent with my experience. There is
substantial flexibility in the decision process by a
program manager. I found the top management in
the DOD agencies quite receptive to the concerns
of the program directors and generally responsive
in all matters but the classic complaint that the program directors need more money. Many of the program directors including myself would have wished that the planning process were less cumbersome, but conditioned upon having such a process, the views of the scientific personnel were heard. In general, it is true that the science budgets pass through military planners who balance research need with other military priorities. Their decision about level of budget may not meet our desires, but I am not aware of any situation in which there was an attempt by nonscientists within the DOD to shape the direction of research. Professor Bass uses this remark to suggest that it would be a good idea to seek gradual realignment of funding from the DOD and place it in the hands of the civilian agency, i.e., the NSF. I personally feel comfortable with 40% of the monies in the hands of the program directors of the DOD. They are bright, well-motivated people who do an excellent job for the mathematical sciences community. What is more dangerous, in my view, is to concentrate total spending authority in a single agency. This is bad because it is an "all your eggs in one basket" strategy. Currently, mathematical sciences are in favor at NSF, but there is certainly no guarantee that they will always be. It is better to have diversity, not only in sources of funding, but also in perspective and imagination. The agencies are complementary in approach and this is, in my view, fundamentally desirable.

Finally, the comments of Steven Weintraub are those of a mathematician's mathematician, i.e., tightly coupled logic from basic axioms. I find no fault with his arguments. I do, however, find that his axioms do not correspond to reality. I have already indicated that I believe the mathematical sciences have a legitimate role to play in the defense of the United States. It seems to me that the American Mathematical Society should generally be supportive of the American Department of Defense (i.e., without being blind to its weaknesses and excesses). The case may be different if we were the International Mathematical Society. The other comment I would make is that Professor Weintraub endows the DOD with a monolithic character it simply does not possess. DOD is a massive decentralized organization made up of many individuals. It is frustrating to get concurrence within the DOD as any DOD executive can testify. To use language like "agency A (the DOD) is interested in area X" is naive. The DOD doesn't make decisions, individuals within the DOD make decisions. This is particularly true of comments such as the remarks attributed to Donald Hicks. While Donald Hicks was in a high position in the DOD, his unfortunate remarks had no influence whatever in the actual day-to-day decision making process of who gets research contracts. And while I too would agree that there is no guarantee that some-one in DOD will not again make such a remark, simply making such a remark has little influence in the broad DOD research establishment. It is much akin to asking the American Mathematical Society to guarantee that no member of the AMS will ever again issue an incorrect proof.

I like to compare the DOD to the university system in America. Both are large complex organizations, largely decentralized and made up of many individuals with a spectrum of beliefs and persuasions. It is as incorrect to think that the DOD acts with one mind as it is to think that the universities do. What is true is that the individuals within the DOD responsible for mathematical science are mathematical scientists and are susceptible to persuasion. Not only that, but the DOD and Congress as a whole are susceptible to political persuasion. Thus, it is extremely likely that if mathematicians stay in dialogue at all levels, there is every chance they will be heard and exhibit the positive influence for which they might hope.

As a final remark, my comments are made as a private citizen and as a member of the AMS. They have not been subject to any DOD review nor do they represent any DOD position.

Seymour V. Parter

University of Wisconsin-Madison

Let me begin by asserting that, along with many of my friends and colleagues, I have very strong reservations about the scientific (military) validity of the SDI program. I make this statement not because I must make it to have the right to participate in this discussion, but rather because I believe it is essential that we understand our role in this discussion. My views on SDI are not a scientific conclusion. Rather, they are a political conclusion reached in the same way millions of other citizens have reached their conclusions on this vital question. I have read and listened to those scientists (primarily physicists) and engineers who can and do claim scientific expertise. Having done this, I have then decided which set of experts I would believe. Thus, I came to my conclusions. I would be a liar if I were to claim that my particular professional expertise made me qualified to render an intelligent scientific judgement on this very complicated question. Further, I have no reason to believe that any of the mathematicians who have expressed their opinion (in the January 1987 Notices or the February 1987 Notices) have any more scientific expertise (than 1) in this area.

Once we understand how I have come to my opinions on SDI, we must face two possibly unpleasant facts. First: Most of the experts I trust also strongly support ongoing, if limited, theoretical studies on the scientific problems (as opposed
Some opinion for the moment calling for classification as there is such content for research. On the bottom of the quip, I note work is useless, but AMS will not mediate between agencies for this member? If I were that person, I would be outraged. And rightly so.

Before anyone forms an opinion on Motion 2, they should read:

In the first four short notes from the Notices, we see a situation very similar to the current one. The President and his Administration have undertaken a controversial direction. The academic community, including some mathematicians, has loudly objected. Certain people, in relatively high places in the bureaucracy, e.g., Undersecretary Donald Hicks, make outrageous statements. So what is new? But, more important, a more careful reading of these four short items quickly dispels the notion that NSF is “good,” “enlightened,” etc., while the DOD agencies are inherently evil, anti-scientific, etc. No, unfortunately, the world is more complicated. Finally, a reading of Levinson’s article might remind us of the fundamental fact: The question is not which agency you credit on the bottom of the first page of your paper, the question is—is there any intellectual content to your work? If there is, then whether you like it or not, someone will find a use for it. And you won’t control that use. If on the other hand, there is no content to your work, why should anyone fund it?

Of course, I am writing of the maligned research which “I would do anyway, supported by NSF or DOD.” For those of you who don’t believe there is such research: ... stop reading now—you won’t understand.

There is other DOD research: Specific, project-oriented, possibly classified. In my (personal) opinion classified research does not belong on the campus and my university would not administer a contract calling for classification. As for the more specific, project-oriented research which is not classified, morality is a private matter. Each person must consider each case, as it concerns them—and then decide. Our organization, the AMS, should not make them second class members.

Finally, there is a very serious matter of general scientific policy. Some of the statements in favor of Motion 2 suggest that it would be good if the nation had two distinct scientific establishments: one academic, open and “pure,” the other military and secret. Such a situation is impossible. But, never mind its feasibility, let’s talk about its desirability. Frankly, such a situation would be a national disaster!! Those of us concerned with the current national debate on SDI and the earlier (pre-ABM treaty) debate on ABM deployment should realize that the reason this debate is even possible is only because of the structure of our current single scientific enterprise. How is it that there are people both knowledgeable and concerned who bring the discussion into the open? These people, those who have helped me formulate my opinions, are usually not full-time employees of a DOD or DOE Laboratory. However, by virtue of their interactions with such a laboratory, they are knowledgeable and understanding of the technical matters. Since they have great scientific stature and their access to the national laboratories is well known, they cannot be dismissed by a simple “ah, if only we could tell you of what we are accomplishing in our secret laboratories.”

Suppose the only people who knew what went on in the DOD and DOE Laboratories were full-time employees of those laboratories who did not publish or participate in the academic, open scientific environment. Then those people would 1. be very fearful for their livelihood and be unwilling to promote a dialog on controversial weapons programs and 2. have no scientific credibility to give weight and respectability to their criticisms and comments. No, the fact is, our healthy democracy which, despite all the pain and anger involved, allows for these kinds of discussions, demands that we not have two segregated scientific establishments.

As you see, I oppose both motions. Moreover, should either pass, I would resign from the AMS at once. I sincerely hope that won’t happen.

James Glimm
New York University
Courant Institute
of Mathematical Sciences

The motions proposed at the San Antonio meeting concerning NSF vs. DOD funding have been discussed in a thoughtful fashion in the February 1987 Notices.
There are four important facts that I hope will not be obscured by the debate which may ensue.

Mathematics is a part of science. Most major branches of modern mathematics (e.g., group theory, Fourier analysis, and differential equations) not only had their origins in science, but have been continually enriched by their renewed contact with science. The track record of the mission-oriented agencies in identifying topics from science ripe for mathematical development is probably better than, and certainly is at least as good as, that of the NSF.

Mathematics is a part of society. We acknowledge this fact by soliciting and receiving society’s support from the NSF as well as from the DOD. Our society’s real or perceived needs change from time to time. I recall a past emphasis on urban planning, alternate energy sources, and the protection of our environment. I recall a war on cancer and the moral equivalent of war for energy self-sufficiency. Most of these problems have not been solved and are still appropriate for mathematical modeling and problem solving. The current discussion concerns the military, and I suspect that major future concerns will include economic competitiveness and modeling of the AIDS epidemic. It is the political process which sets these goals, and as knowledgeable and concerned citizens, it is appropriate for us to participate as individuals in the political process. It is customary, and I think wise, for a professional society to maintain a certain distance from partisan politics.

Mathematicians, to the extent that they are concerned with the problems of science or of society, usually prefer to work upon the most fundamental aspects of these problems. Such questions as individuals vs. group research efforts are important and should be discussed more broadly than in the context of the San Antonio notion. The proper balance between fundamental vs. applied research is also important, but considerable skill will be required to discuss this in a manner that does not pit one group of mathematicians against another and, in fact, fragment the mathematics community. The central question is the following. If we are going to make promises to our fellow scientists in other disciplines, or to society, about the importance of mathematics, its long range benefit to society, etc., how can we ensure that these promises are honestly and realistically made, effectively worked upon, and ultimately fulfilled? The answer is that it should not be the distinction: fundamental vs. applied research that concerns us, but rather that fundamental and applied research effectively working together on common problems, from different perspectives should be our goal.

Mathematics has a unique joy and a beauty of its own. We know this as a fact and the scientific community expects us to be true to ourselves and to insist upon it. This message should not be lost in the discussion of other matters.
Document Production: Visual or Logical?

Leslie Lamport

The Choice

Document production systems convert the user's input—his keystrokes and mouse clicks—into a printed document. There are many different ways of classifying these systems. I will discuss a classification based on the extent to which the user regards his document as a visual structure rather than a logical one. A system in which the user specifies a visual description of the output will be called a visual system, and one in which he specifies the logical structure of his document will be called a logical system. Visual systems may be more convenient for short, simple documents like love letters or laundry lists. However, I will argue that logical systems are better for more complex documents like books and technical articles.

In a purely visual system, one would simply paint a collection of pixels on the screen. The word "cat" would be no different from a picture of a cat—the user could change the shape of the t
as easily as he could change the shape of the tail in a picture of a cat. Finding all instances of cat and replacing them by dog would be as hard as finding all cats in a picture and replacing them with dogs.

In a purely logical system, one would enter only the logical structure of a document, describing such things as words, paragraphs, theorems, sections, and cross-references. The system would translate this logical structure into a collection of dots on sheets of paper, with the user giving only general instructions—for example, specifying two-column output formatted for a conference proceedings.

There are no purely visual systems used for document production. All systems keep some logical representation of the document that they use to generate the pixels. The most primitive ones keep only the letters that generate the characters. In such a system one can easily find all instances of cat, but a search for all instances of domestic would miss the ones in which the word is hyphenated across lines. More sophisticated systems keep more of the logical structure, thereby acting more like logical systems. It is my thesis that such systems are good for serious document production only to the extent that they act like logical systems.

I know of no purely logical system that is currently available. Systems like Scribe and LATEX permit the user to describe the visual appearance as well as the logical structure of the document—for example, by inserting a command to add a quarter-inch vertical space. The need to provide the user with such commands is a symptom of the deficiencies of these systems.

Current logical systems require the user to describe his document as a text string, filled with obscure-looking commands. This is a cumbersome way to represent the logical structure of a document; it is a sign of the primitive nature of these systems, not an inherent feature of logical document production. Systems can be built to allow more convenient editing of the document's logical structure. I'm not interested in the question of whether the inconvenience of describing the document with an ASCII text file is bad enough to make visual systems preferable. Choosing between two evils is never pleasant. I will confine myself to arguing the inherent superiority of logical systems to visual ones.

Computers Work Logically, Not Visually

In a recent paper, I used the notation $f_x^e$ to denote the result of substituting $e$ for $x$ in $f$. With a visual system, I would have entered this notation by simply putting the $e$ above and to the right of the $f$ and the $x$ below and to the left. Using LATEX, I might have typed the formula as $f^e(x)$, the command indicating a superscript and _ indicating a subscript. The input would have been a partially logical and partially visual description—logical because the subscript and superscript are denoted logically by commands rather than visually by placement, but visual because it describes the representation (super- and subscript) rather than the logical concept of substitution. I therefore chose to define a command \subfor of three arguments, not typed the formula $f_x^e$ as \subfor(f(e)(x)). The input then unambiguously describes the logical structure that it represents. For example, the input would distinguish the result of substituting $3$ for $i$ in $s$, represented as \subfor(a)(3)(i), from the cube of the $i$th element of a sequence $s$, represented as $s^3(i)$, even though both are printed as $s^3$.

After I had completed the first draft of my paper, someone told me that I had used the wrong notation; the result of substituting $e$ for $x$ in $f$ should be denoted by $f_e^x$ rather than $f_x^e$. I had to reformat my paper to conform to the correct notation. Had I used a visual system, in which only the visual representation is maintained, I would have had to examine every page visually to find all instances of the notation and changed each one individually. Had I used the half-logical method, entering \subfor{e}{x}, I could have written a program to find all ten strings of the form \dots{\subfor{e}{x}}{\ldots} and allow me to choose whether to transform it. (Human intervention would still be required to prevent changing the cube of $s_i$ to $s_3^i$.) Having chosen a logical representation, I merely had to change the definition of the \subfor command—a simple change at a single point in the text.

The ease of making the change when the notation was represented logically rather than visually was no fluke; it was a consequence of the fundamental fact that computers are good at processing logical information, but had no processing visual information. Recognizing that $f_x^e$ is a single logical entity with three components is a difficult problem of artificial intelligence if one is given only the visual representation, but it is a trivial programming exercise if $f_x^e$ is represented as \subfor{f}{e}{x}.

Writing or Formatting?

The purpose of writing is to convey ideas to the reader. The worst aspect of visual systems is that they subvert the process of communicating ideas by encouraging the writer to concentrate on form rather than content. Ideas are conveyed by the logical structure of the text; the function of the visual format is to display this structure. The author should be concerned with the structure, not any particular visual representation.

Visual systems encourage the user to substitute formatting for good writing. A simple example is the use of vertical space.
an awkward transition from one paragraph to the next, the user of a visual system can simply add some vertical space between the paragraphs. But, what does this space accomplish? The awkward transition is still there; the reader is still jarred by it. The extra space simply declares that there is an awkward transition and the author is either too lazy or too bad a writer to fix it.

An awkward transition is a symptom of a poorly structured document; it can be fixed only by restructuring the document. A logical system forces the writer to think in terms of the document's logical structure; it doesn't give him the illusion that he is accomplishing anything with cosmetic formatting changes.

Phosphors or Ink?

Proponents of many visual systems boast that they let the user work with an exact replica of the printed page. In fact, a serious drawback of many visual systems is that they force the user to work with an exact replica of the printed page. When the author is editing his document, he becomes a reader. Like any reader, he wants to be presented with the document in a format that is easy to read. A format that is adapted to the printed page is a poor one for a screen. Phosphors are different from ink, and a screen is not a piece of paper; it is not easy to read a picture of a printed page on a screen.

A computer screen differs from a printed page in many ways, including resolution, width, and the availability of different colors. Each of these differences implies differences in the way information should be displayed. In addition to the differences in the two media, the presence of a computer behind the screen also has striking implications. Consider the problem of pagination.

One of the worst features of books is the splitting of text across pages. It would be easier to read a document straight through, from front to back, if it were printed as a continuous scroll. We use books rather than scrolls because they are easier to produce and because documents are not always read in such a linear fashion. The computer offers the best of both worlds. We can scroll through text, avoiding distracting page breaks, and still move easily to another part of the document. It is senseless to use a computer to simulate a book, complete with page breaks.

A typical writer of technical material spends two to eight hours per page writing. He spends much of that time looking at the representation of the document on his screen. A visual system that forces the writer to view on his screen a version formatted for paper makes his task harder.

Who Should do the Formatting?

Logical systems attempt to remove formatting concerns from the author. The author specifies only the general form of the output—technical report, journal article, etc.—while the system makes the actual formatting decisions—amount of paragraph indentation, amount of space above a displayed equation, etc. Visual systems give free rein to the author's artistic tendencies, allowing him to format everything as he wishes. This would be fine if documents were meant to be displayed on walls and admired for their aesthetic qualities, but they're not.

The purpose of writing is to convey ideas to the reader. The purpose of formatting is to make the document easier to read, not to look pretty. Document design is a skill acquired through training and experience. A logical system can apply the skill of a trained designer to the formatting of a document. A visual system forces the author to do his own document design, often with disastrous results. Most authors are not competent designers and make typographic errors—formatting decisions that make the document harder to read.

A \LaTeX\ user once complained because he wanted to format an equation to look something like this:

$$\forall i : f(x_i) > g(y_i) \quad (7)$$

Formatting the equation in this way would have been easy with a visual system; he would just have put everything where he wanted it. However, \LaTeX\ provides no easy way to do this. The user just enters the equation and \LaTeX\ formats it the way it wants. (It also assigns the equation number.) If the user declares the \textit{vi} to be part of the equation, the result looks like this:

$$\forall i : f(x_i) > g(y_i) \quad (8)$$

If he declares the \textit{vi} to come before the equation, then \LaTeX\ makes it part of the text preceding the displayed equation.

This particular user found the formatting of (7) more aesthetically pleasing than that of (8), and I agreed with him. However, (7) is a typographical mistake. Equations are numbered so they can be referred to in the text. When the reader encounters a reference to (7), it is not immediately clear from the formatting whether it refers to the entire equation \(\forall i : f(x_i) > g(y_i)\) or just to the inequality \(f(x_i) > g(y_i)\). It is clear from the formatting that (8) refers to the whole equation and that, if the \textit{vi} were part of the preceding text, then the equation number would refer only to the inequality. The formatting of (7) introduces an ambiguity, making the document harder to read.

The purpose of document design is to display the logical structure of the document through its formatting, thereby making it easier to read. A user with no training in design is easily seduced by a visual system into formatting the document to
be aesthetically pleasing, often making it harder to read.

A visual system can make things hard even for a trained designer. An important principle of document design is uniformity—the same logical element should be formatted the same way throughout the document. It is difficult to achieve uniformity if the user must specify the formatting of each instance of the element. For example, all displayed quotations should be indented the same amount, but this is not likely to happen if the user must specify the amount of indentation whenever he types a quotation.

Must the User Ever Format?

There are two reasons why the author may have to specify formatting in a logical system. First, no logical system can provide a complete assortment of predefined logical structures. For example, a general-purpose system is unlikely to provide facilities for formatting recipes. The writer of a cookbook must tell the system how to format recipes—hopefully, after consulting a professional designer. A logical system should permit the user to define his own logical structures and to specify how they are to be formatted. Several different formats might have to be specified for example, one for a single-column page, one for a double-column page, and one for the computer screen. In a logical system he does this once: in a visual system he must format each recipe individually.

The second reason for specifying formatting is to overcome an inherent problem with computers: Embodying design principles into programs is difficult, and a designer will always be able to do a better job of formatting an individual document than will a computer program that he designs. Achieving the highest possible quality requires the ability to make changes to the system’s output. This will be a matter of fine tuning, changing small things as page breaks and figure placements. This is a visual process, and one would like a visual system for doing it—one that allows the user to manipulate screen images of the final output.

If such visual editing is ultimately desirable, why not use a visual system in the first place? The answer is that the fleas should not wag the dog. The changes will generally be of such minor nature that they are not worth bothering with in a preliminary version intended for a small audience, nor for any document that is not widely distributed. They will be done only when producing the final copy for the publisher.

Even using \LaTeX, which does not make the final formatting very easy, I usually spend less than two minutes per page doing the final formatting to produce camera-ready output. This is insignificant compared with the two to eight hours per page I spend writing. There is much more to be gained by making writing easier than by simplifying the final formatting task.

PARTIALLY ORDERED ABELIAN GROUPS
WITH INTERPOLATION
K. R. Goodearl
(Mathematical Surveys and Monographs. Volume 20)

In the past decade a new branch of ordered algebraic structures has grown, motivated by K-theoretic applications and mainly concerned with partially ordered abelian groups satisfying the Riesz interpolation property. This book is the first source in which the algebraic and analytic aspects of these interpolation groups have been integrated into a coherent framework for general reference. The author provides a solid foundation in the structure theory of interpolation groups and dimension groups (directed unperforated interpolation groups), with applications to ordered K-theory particularly in mind.

High points of the development include the following: characterization of dimension groups as direct limits of finite products of copies of the integers; the double-dual representation of an interpolation group with order-unit via affine continuous real-valued functions on its state space; the structure of dimension groups complete with respect to the order-unit norm as well as monotone sigma-complete dimension groups and dimension groups with countably infinite interpolation; and an introduction to the problem of classifying extensions of one dimension group by another. The book also includes a development of portions of the theory of compact convex sets and Choquet simplices, and an expository discussion of various applications of interpolation group theory to rings and C*-algebras via ordered K0. A discussion of some open problems in interpolation groups and dimension groups concludes the book.

Of interest, of course, to researchers in ordered algebraic structures, the book will also be a valuable source for researchers seeking a background in interpolation groups and dimension groups for applications to such subjects as rings, operator algebras, topological Markov chains, positive polynomials, compact group actions, or other areas where ordered Grothendieck groups might be useful.

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800-556-7774 to use VISA or MasterCard.
A Community Says “Thank You”

Warm weather is here again, and with it comes a familiar feeling for many of us—satisfaction with the completion of another academic year blended with anticipation of real time to work and relax; relief that “the year” is over combined with disquiet at the thought of all that must be done over the summer. For those who are people-oriented, it’s a time of farewells, of reappraisals, and of endings called commencements. So it is in Washington, as well as in academia.

This is the time of year when the “rotators” depart, the people from our community, and others like it, who have spent one or more years on leave in Washington to help lead and manage the scientific research and education programs which sustain us. The rewards for this sort of public service are few. The monetary rewards are negative and the experience gained probably has a negative impact on status back in the home department. But much depends on the quality of the people whom our community sends to Washington for these stints. Unless we show them that we value what they do, it will be very difficult to count on having successors of the same high quality.

This year a special thank you is due to three mathematicians, each of whom has put in (at least) a two-year tour of duty, and each of whom has exercised strong leadership on our behalf: Frank Gilfeather, who returns to the University of Nebraska from his position as Staff Director of the Board on Mathematical Sciences (BMS) of the National Research Council (NRC); John Polking, who heads home to Rice University from his post as Director of the Division of Mathematical Sciences (DMS) of the National Science Foundation (NSF); and John Thorpe, Deputy Director of the Materials Research and Informed Science Education Division at NSF, who returns to the State University of New York at Stony Brook.

The BMS grew out of the David Committee effort. Frank Gilfeather, with his two chairmen, Mike Artin and Phil Griffiths, has molded it into an effective force for presenting analyses of the role of the mathematical sciences in the national research effort. He has shaped the National Chairman’s Research Colloquium into an annual fall event that brings department chairs usable information on all things Washington, gathers their input on policy directions, and promotes dialogue among the chairmen. He has gotten the many advisory arms of BMS functioning, from the U.S. National Committee on Mathematics, which relates U.S. mathematics to the International Mathematical Union, to the panels that advise the Office of Naval Research. He has generated each year highly visible events as part of National Science Week, maintained a close liaison with the heads of math programs in federal agencies, and has steadfastly driven home to “his” Board the importance of collegiate mathematics education for their concerns.

John Polking inherited the mantle of Jim Infante at NSF, and he has worn it well, carrying forward the program to increase funding for mathematical research with imagination and with a steady perseverance which has earned him the respect of the upper management of NSF. One result has been continued Foundation support of substantial increases for the DMS, which still accounts for 60% of the total federal support for research in our field. John has pushed to have NSF resources for collegiate mathematics located in his division. He has initiated a small mentoring program for talented undergraduates and plans, in addition to his consistent articulation of the basic research needs of mathematics, for a substantial NSF investment in the reformation of calculus. An important legacy he has left is a five-year plan for more than doubling the Division’s budget, building on the David Report and paralleling NSF Director Erich Bloch’s plan for a similar doubling of the Foundation budget.

John Thorpe left his role as undergraduate chairman at Stony Brook two years ago to accept a temporary position in the Science and Engineering Education Directorate at NSF. He did this because of his conviction that University mathematicians must become actively involved with precollege education issues. As John has said, he went to NSF and began to learn about the really hard issues and the pockets of creative work going on in the development of materials for school mathematics. He used the knowledge acquired and his status as ranking mathematician in the “Science Ed” directorate to create one of the first NSF initiated programs in the reincarnation of the Directorate, his $5 million five-year program in the development of materials to incorporate computer technology into the early years of mathematics education.

Those of us carrying on in the small community of mathematicians who constitute the ever-changing Washington presence of the mathematics community will feel very directly the absence of Frank Gilfeather, John Polking, and John Thorpe. We can find local and immediate ways of expressing respect and gratitude for the jobs they have done. It is to be hoped that numbers of you out there in the community whose respect they value most will call or write them to say that you appreciate their efforts on your behalf.
AMS Postdoctoral Research Fellowship

The Society has awarded two Postdoctoral Research Fellowships for 1987–1988. The recipients are Richard Hain of the University of Washington and Bill Jacob of Oregon State University.

Richard Hain received his Ph.D. from the University of Illinois, Urbana, in 1980 where he studied under Professor Kuo-Tsai Chen. Since then he has taught at the University of Washington (1980–1983), the University of Utah (1983–1984), and State University of New York at Buffalo (1984–1985). He has been an assistant professor at the University of Washington since 1985.

Professor Hain also received a University of Sydney Postgraduate Travelling Scholarship (1978–1980). He intends to use his AMS Fellowship over a period of two years, beginning with a visit to the University of Chicago next year.

Bill Jacob received his Ph.D. from Princeton University in June 1979, under the direction of Simon Kochen. He was an E. R. Hedrick Assistant Professor at the University of California, Los Angeles (1979–1981) and used an NSF Research Fellowship to visit the University of California, Berkeley (1981–1982). In 1982, he joined the faculty of Oregon State University, where he is currently an associate professor.

Professor Jacob visited the University of California, San Diego, during 1984–1985 and is a member of the Mathematical Sciences Research Institute at Berkeley (1986–1987). Jacob’s current research interests include the Algebraic Theory of Quadratic Forms, Brauer Groups, and Algebraic K-Theory. He plans to use his AMS Fellowship to visit the University of California at Berkeley.

The AMS Research Fellowship fund was established in 1973 in response to the need for funds for postdoctoral research. The fellowships are awarded on the basis of mathematical merit to persons who are five to ten years past the Ph.D., but below the academic rank of professor (regardless of age). Fellows must be citizens or permanent residents of a country in North America. The awards are intended to support research fellows for a period of one year and, at present, carry a stipend of $30,000 each with an expense allowance of $1,000. The competition was held under the supervision of the Society’s Committee on Postdoctoral Fellowships, consisting of J. William Helton, Philip C. Kutzko, Stephen Lichtenbaum, George Lusztig, Kenneth C. Millett (chairman), M. Beth Ruskai, and Nancy K. Stanton.

Because of the generosity of the AMS membership this past year, it was possible to offer more than one fellowship for the first time in several years. The fellowship is financed by contributions from supporters of mathematical research supplemented with Society funds appropriated according to a matching formula. The continued support of the AMS Research Fellowship program depends on the contributions the Society receives. Every member of the Society is urged to contribute.
Mathematical History

The AMS Centennial Celebration in 1988 provides an opportunity for the Society to highlight the role mathematics has played in the development of science and technology. One activity planned in this connection is the publishing of books and articles of a historical nature. The publication of such manuscripts is a departure from the Society's traditional involvement with research-oriented material and, therefore, assistance from the mathematical community is requested in acquiring historical works. The Society is also interested in locating existing manuscripts about twentieth-century mathematicians and historical accounts, which could be incorporated into a collection of reprints. A committee has been appointed for this project:

Peter Duren, University of Michigan, Chairman; Richard Askey, University of Wisconsin; and Uta Merzbach, Smithsonian Institution.

If you are planning to write or are currently writing a manuscript on the history of mathematics, or if you have information about existing manuscripts, you are invited to contact Ms. Mary C. Lane, Director of Publication, P. O. Box 6248, Providence, RI 02940, for further details about this activity. Information and manuscripts may also be forwarded directly to the committee members.

the fund. Since the deductibility of charitable contributions was essentially unchanged with respect to the new tax laws, contributions to the Fellowship Fund are, in most instances, still tax deductible. Checks should be made payable to the American Mathematical Society, clearly marked "AMS Research Fellowship Fund," and sent to the American Mathematical Society, P.O. Box 1571, Annex Station, Providence, RI 02901.

In recognition of the Centennial Celebration of the Society, the Council has approved changing the name of the research fellowship program to the American Mathematical Society Centennial Research Fellowship. This change will be effective beginning with the 1988-1989 program.

Guggenheim Fellowships Awarded

The John Simon Guggenheim Memorial Foundation has announced the award of 273 fellowships in its sixty-third annual competition. The new Guggenheim Fellows were appointed on the basis of unusually distinguished achievement in the past and exceptional promise for future accomplishment. This year's list of awards includes fourteen in the mathematical sciences.

Names of the recipients, their positions, institutional affiliations, and their proposed studies are: ROBERT C. BERWICK, Associate Professor of Computer Science and Engineering, Massachusetts Institute of Technology (The computational structure of natural language); ALEXANDRE JOEL CHORIN, Professor of Mathematics, University of California, Berkeley (Computational methods in turbulence theory); GENE H. GOULIB, Professor of Computer Science, Stanford University (The solution of large sparse systems of linear equations); JOSEPH D. HARRIS, Professor of Mathematics, Brown University (The geometry of moduli spaces); NICHOLAS M. KATZ, Professor of Mathematics, Princeton University (Studies in arithmetic algebraic geometry); JAMES LEPOWSKY, Professor of Mathematics, Rutgers University (Studies in infinite-dimensional Lie theory); CHUNG LAUNG LIU, Professor of Computer Science, University of Illinois at Urbana-Champaign (The computer-aided design of integrated circuits); MARC MANGEL, Professor of Mathematics and Adjunct Professor of Agricultural Economics, University of California, Davis (Dynamic models in behavioral and evolutionary ecology); ALEXANDER NAGEL, Professor of Mathematics, University of Wisconsin-Madison (Studies in harmonic and complex analysis); WILLIAM I. NEWMAN, Associate Professor of Planetary Physics, Astronomy, and Mathematics, University of California, Los Angeles (Studies in astrophysical and planetary fluid dynamics); RICHARD A. OLSHEN, Professor of Mathematics, University of California, San Diego (Studies in modeling and sample reuse techniques); MARINA RATNER, Professor of Mathematics, University of California, Berkeley (Studies in the ergodic theory of semi-simple Lie groups); MURAD S. TAQQU, Professor of Mathematics, Boston University (The probabilistic and statistical aspects of self-similar processes); JON A. WELLNER, Professor of Statistics, University of Washington (Efficient estimation for semiparametric models).

Rollo Davidson Trust

Rollo Davidson Prizes have been awarded to Yu Yao-Chi of Zhong Shan University, Gangzhou, and Zou Jie-Zhong of the Changsha Institute of Railways (joint award) and to Andrew Carverhill of the University of North Carolina.

Yu Yao-Chi and Zou Jie-Zhong received the award for their contributions which together led to the proof of D. G. Kendall's modified version of Davidson's conjecture concerning the oscillation of p-functions. Andrew Carverhill was cited for his work on the flows of stochastic dynamical systems and their Lyapunov exponents.

The first Rollo Davidson Prize was awarded in 1976. Since then eighteen prizes have been awarded. The work of the Trust is supported by royalties and individual donations. Communications relating to the work of the Trust should be addressed to its Secretary, The Bursar, Churchill College, Cambridge, CB3 0DS, England.
Nerode Appointed Director of MSI


After completing his graduate studies at Chicago, Ani! Nerode was a postdoctoral fellow at the Institute of Advanced Study at Princeton University and then a visiting assistant professor at The University of California at Los Angeles. He came to Cornell in 1959 and became Chairman of the Mathematics Department in 1982. Professor Nerode’s major areas of research include Mathematical Logic, Recursive Function Theory, and Theoretic Computer Science. Much of his work has been accomplished through consulting, project directorships, research grants, and research contracts with the Department of Defense, The National Security Agency, The Institute for Defense Analyses, The Advanced Research Projects Agency, The National Science Foundation, The Netherlands, and numerous industrial and nonprofit research organizations.

MSI supports research through an aggressive program of Cornell faculty support, graduate fellowships, postdoctoral associates, and senior visitors. Additionally, MSI conducts workshops throughout the year on topics of current interest to the mathematical research community. Information about any of these programs can be obtained by calling MSI at 607-255-8005, or writing: MSI, 294 Caldwell Hall, Cornell University, Ithaca, NY 14853.

\section*{\TeX\ Users Group’s Annual Conference and Regional Courses}

The \TeX\ Users Group’s Annual Conference will be held at the University of Washington, Seattle, Washington, August 17-28, 1987. In addition to its three-day meeting, August 24-26, several \TeX\ courses will be offered: Beginning \TeX, August 17-21; Intensive Beginning/Intermediate \TeX, August 17-21; Macro Writing, August 27-28; and Output Routines, August 27-28. (All instruction is applicable to using \TeX\ on the Macintosh, PC’s, and mainframes.)

A portion of this year’s meeting program will be devoted to “\TeX\ for the Humanities.” However, the overall program will continue to include sessions on issues of implementation, hardware and software support; \TeX\, \WEB\, and METRONINT; a macro wizards’ roundtable presentations on output devices and drivers; commercially available macro packages; and exhibition of the latest \TeX\ products, software, and output devices; plus many other topics of current concern to the \TeX\ community. Also, this year facilities will be available for copying floppies, so that participants may share their \TeX\wares with each other.

In addition to the programs presented at their annual meeting, \TeX\ training courses are offered at universities throughout the U.S., and this year the \TeX\ Users Group is expanding its educational programs to England, The Netherlands, and Norway. Courses being offered include Beginning, Intermediate, and Advanced \TeX, Macro Writing, and Output Routines.

Requests for additional information about the meeting program and courses should be directed to \TeX\ Users Group, P.O. Box 9506, Providence, RI 02940, U.S.A. Telephone: 401-272-9500, extension 323.

\section*{Applied Mathematicians to Hold International Meeting}

Applied mathematicians will convene on a worldwide basis for the first time from June 29 to July 3 at the First International Conference on Industrial and Applied Mathematics (ICIAM 87) in Paris, France. ICIAM 87 marks the first time that the commonality of applied mathematics will be placed on view for an international audience.

Over one thousand papers from sixty-six countries are scheduled along with sixty-nine minisymposia, each featuring three or four speakers.

Four organizations are sponsoring ICIAM 87: the Society for Industrial and Applied Mathematics in Philadelphia, PA; la Société de Mathématiques Appliquées et Industrielles, Palaisseau, France; Gesellschaft für Angewandte Mathematik und Mechanik, Hamburg, Germany; and the Institute of Mathematics and its Applications, Southend on Sea, Essex, Great Britain.

Invited presentations will cover the following topics:

\begin{itemize}
  \item \textbf{Vortex dynamics:} The interaction of numerical analysis, scientific computing, and mathematical theory, Andrew J. Majda, Princeton University, U.S.A.;
  \item \textbf{Numerical flow simulation in aerospace industry,} P. Perrier, Aerodynamic Department, Avions Marcel Dassault/Bréguez Aviation, Saint–Cloud, France;
  \item \textbf{Aeronautical acoustics:} Mathematics applied to a major industrial problem, D. G.
\end{itemize}
During 1986-1987, MSRI is featuring a large program in arithmetic algebraic geometry. Among the advances which have attracted attention during the year is the work of Kenneth A. Ribet of the University of California, one of the organizers of the 1986-1987 program.

Ribet’s advance concerns irreducible mod p representations of Gal (Q/Q) which arise from classical cusp forms of a certain type (newforms of weight 2 and trivial character in the language of Atkin-Lehner). Let f be such a cusp form, let N be its level (or conductor), and let \( \rho \) be the corresponding representation. One can attach to \( \rho \) a “level” \( L \), where \( L \) divides \( N \). According to conjectures made by J.-P. Serre, there should be a cusp form \( g \) of level \( L \) which gives the same representation as \( f \). Ribet proved this conjecture in a large class of situations, including that for which \( N \) is square free.

Ribet’s work completes a program begun by G. Frey of Saarbrucken, concerning Fermat’s Last Theorem. The final result is that Fermat’s Last Theorem is a consequence of the generally accepted conjecture that all elliptic curves over \( Q \) arise from cusp forms. The link between solutions of Fermat’s Last Theorem and elliptic curves was found by Frey: beginning with a nontrivial solution of \( a^p + b^p + c^p = 0 \), Frey writes down an elliptic curve \( E \) over \( Q \) whose \( p \)-division points give a representation \( \rho \) which has conductor 2. If \( E \) comes from modular forms, then \( \rho \) does; by Ribet’s theorem, \( \rho \) then comes from a cusp form of level 2. A contradiction arises because there are no level 2 newforms of the type in question.

Ribet’s main ideas were worked out in a preliminary form at the Max-Planck Institut in Bonn, prior to the beginning of MSRI’s number theory year; then they were amplified and clarified in Berkeley.

The plans for 1987-1988 at MSRI are nearly complete as this is being written. A total of approximately 150 visitors are expected: about 75 for the program in Classical Analysis, 55 for the program in Representations of Lie Groups, and 20 in mathematics at large (nicknamed “Area III”). The year will conclude with an intensive program on the Structure of Banach Spaces running from June 27 to July 15, 1988.

In 1988-1989, the two programs will be Combinatorial Group Theory and Geometry, and Symplectic Geometry and Mechanics. Again there will be a microprogram topping off the year: Noncommutative Rings from July 5 to July 19, 1989. For 1989-1990, one program is set: Logic.

MSRI welcomes suggestions for future programs.
Request for Photos

In conjunction with the Centennial of the American Mathematical Society, which is to be celebrated in Providence in 1988, the AMS would like to set up an exhibit of group photos from meetings and similar items of interest.

If anyone has memorabilia of this kind which they would like to give or loan to the AMS, please write to William J. LeVeque, Executive Director, American Mathematical Society, P.O. Box 6248, Providence, Rhode Island 02940.

Newly Elected Members of the National Academy of Sciences

The following mathematical scientists have been elected to membership in the U.S. National Academy of Sciences: ARMAND BOREL, Institute for Advanced Study; DANIEL GORENSTEIN, Rutgers University; and ROBERT E. TARJAN, AT&T Bell Laboratories. BENoit B. MADELBROT, IBM Thomas J. Watson Research Center, was elected a foreign associate of the Academy.

SOME MATHEMATICAL QUESTIONS IN BIOLOGY—CIRCADIAN RHYTHMS

Gail A. Carpenter, Editor

The articles in this collection are based on lectures given at the 20th Annual Symposium on Some Mathematical Questions in Biology, held in May 1986, and sponsored jointly by the AMS, the Society for Industrial and Applied Mathematics and Section A of the American Association for the Advancement of Science. For the past thirty years, due particularly to the fundamental work of Pittendrigh, Aschoff, and Wever, theoretical analysis of circadian rhythms and sleep have gone hand in hand with experimental and clinical studies. Circadian rhythms have been investigated at levels ranging from cell fragments to humans, for which some investigators postulate pacemaker systems with two coupled oscillators, while others propose single oscillator models. Other analyses focus upon the activity patterns of small vertebrates or upon anatomical and physiological recordings. The mathematical formulations and analyses utilize nonlinear dynamical systems, stochastic models, and computer simulations. The articles in this volume discuss, analyze, and compare these various experimental, theoretical, and mathematical approaches.

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NSF-NATO Postdoctoral Fellowships
Awarded

The NSF has announced the award of fifty-eight National Science Foundation-North Atlantic Treaty Organization (NATO) Postdoctoral Fellowships in Science.

The fellowships are awarded to young scientists and engineers for full-time postgraduate study abroad at institutions and laboratories in NATO countries or in neighboring countries that cooperate with NATO.

The four recipients in the mathematical sciences are listed below (institutions in parentheses are the current institution, those outside the parentheses are those at which the fellowship will be held): BRUCE J. BAYLY (New York University) University of Cambridge, England; DEBORAH M. GORDON (Harvard University) University of Oxford, England; PAUL F. MENDLER (Cornell University) Manchester University, England; and JUAN C. MIGLIORE (Drew University) University degli Studi di Trento, Italy.

Graduate Fellowship Awards
Announced

Five hundred and five outstanding college students are being offered fellowships for graduate study in the natural and social sciences, mathematics, and engineering, the National Science Foundation recently announced.

Nearly 4,730 students submitted applications in the nationwide competition for the NSF Graduate Fellowships, which are awarded on the basis of merit.

Panels of scientists, assembled by the National Research Council of the National Academy of Sciences, evaluated the applications; final selections were made by the NSF. In addition to the fellowship awards offered, the NSF awarded Honorable Mention to 1,212 applicants in recognition of their potential for scientific and engineering careers.

The new fellowships provide a stipend of $12,300 per year for full-time graduate study. This rate is $100 per month higher than for continuing fellows in order to cushion the effect of cost-of-education allowance of $6,000 is also provided by the NSF in lieu of all tuition and fees to the U.S. institution selected by each fellow.

NSF Graduate Fellows may attend any appropriate nonprofit U.S. or foreign institution of higher education. Each fellowship is awarded for three years of graduate study. The fellowships may be used over a five-year period to permit students to incorporate teaching or research assistantships into their education during periods in which they are not receiving their fellowship stipends.

The new fellows come from 48 states, the District of Columbia, and Puerto Rico. Of the 505 award offers, 178 were made to women. By scientific discipline, the distribution of awards was as follows: 109 in engineering; 22 in mathematics; 15 in applications of mathematics; 34 in computer science; 37 in physics and astronomy; 37 in chemistry; 17 in earth sciences; 136 in biological sciences, including biochemistry; and 98 in the social sciences and psychology.

The recipients in the mathematical and computer sciences are listed below (institutions listed in parentheses are those awarding bachelor’s degrees, those listed outside the parentheses are those at which graduate study will be pursued): ANNAMARIA BEatrice AMENDA (Yale University), University of California, Berkeley; THOMAS D. ANDREWS (Yale University), Massachusetts Institute of Technology; JAMES DAVID ASPNES (Massachusetts Institute of Technology), Massachusetts Institute of Technology; ANDREW B. BAKER (Harvard University), Stanford University; ANDREA LOUISE BERTOZZI (Princeton University), Princeton University; AVRIM LOUIS BLUM (Massachusetts Institute of Technology), Massachusetts Institute of Technology; JEFFREY STEWART BONWICK (University of Delaware), Stanford University; INGRID KARIK BUSCH (Hillsdale College), Johns Hopkins University; CLARA SOPHIA CHAN (Harvard University), University of California, Berkeley; DAVID ARI CHANEN (Massachusetts Institute of Technology), Massachusetts Institute of Technology; DOUGLAS ANDREW CHIN (University of Texas, Austin), University of California, Berkeley; JEFFREY MICHAEL CONROY (University of California, San Diego), Stanford University; GREGORY ALAN DECroIX (Miami University) Rutgers University; IAN HEPBURN DINWOODIE (Montana State University), Northwestern University; ADAM LAWRENCE EPSTEIN (Harvard University), Stanford University; OREN WILLI ETZIONI (Harvard University), Carnegie-Mellon University; MICAH ELTOR FOGEL (University of Washington), University of California, Berkeley; BJORN N. FREEMAN-BENSON (University of Washington), University of California, Berkeley; ERICH JAY FRIEDMAN (Rose-Hulman Institute of Technology), Cornell University; PETER STEWART GEMMELI (Yale University), University of California, Berkeley; SANJAY GHEMAWAT (Cornell University), University of California, Berkeley;

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The NSF is now accepting nominations for its most prestigious awards, the Presidential Young Investigator award. The deadline for nominations for the 1988 awards is October 1, 1987.

The awards, which fund research by faculty at or near the beginning of their careers, are intended to help universities attract and retain outstanding young scientists and engineers who might otherwise pursue nonteaching careers.

From 1984 to 1987, there have been 32 awards from 182 nominations in mathematics out of a total of 700 awards from almost 4,000 nominations. Among the fields housed in the NSF: Mathematical and Physical Sciences directorate, mathematics has received 15% of the awards with awards over a broad range of mathematical disciplines.

Some of the rules regarding eligibility have been revised. Below is a list of some of the most important features of the awards.

Award size. The awards provide a base grant of $25,000 per year for 5 years. In addition, the NSF will match, on a dollar-for-dollar basis, donations of up to $37,500 from industry or from nonprofit, private foundations (excluding those associated with particular universities or university systems).

The donations may be in the form of cash grants, research contracts, or permanent research equipment. The equipment must be of a type and quality necessary to carry out the research
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released in May of this year.

nomination,

and must be nominated by an institution which

has offered the nominee a tenure-track position

toegin{align*}
\text{{before Octobter 1, 1988, and he or she must}
\text{hold that position when the award begins.}}
\end{align*}

Nominees must be United States citizens or

permanent residents.

 Eligible institutions. To make a nomination,

an institution must offer a bachelor's, master's,

or doctoral degree in any field supported by the

NSF.

For more information, call the Research Ca-

cer Development program of the NSF, 202-357-

9466, and ask for the program director of the PYI

awards. A pamphlet containing the revised rules

was released in May of this year.

New DMS Director Announced

Judith S. Sunley has been named Director of the

NSF's Division of Mathematical Sciences (DMS).

Having served as Deputy Director of the DMS

since 1984, Sunley will replace John Polking, who

will leave the NSF in July.

Sunley received her Ph.D. in mathematics in

1971 from the University of Maryland, and for

the next ten years was on the faculty of American

University in Washington, DC. She originally

joined the NSF as Program Director for Algebra

and Number Theory in 1980.

NSF-CBMS Regional Conferences

in the Mathematical Sciences

A firm date has now been announced for the regional conference on Theory and Applications

of Multivariate Splines, Charles Chui (Lecturer).

This conference will be held August 10-14, 1987,
at Howard University. For further information,
contact Daniel Williams, Department of Math-
ematics, Howard University, Washington, DC

Employment of Ph.D. Scientists

and Engineers

Since 1973, the NSF has collected information on

the demographic and employment characteristics

of United States doctoral scientists and engi-

neers by using surveys conducted by the National

Academy of Sciences/National Research Council.

Recently, the NSF published highlights from a

1985 survey on employment trends among science

and engineering (S/E) doctorates, and the follow-

ing summarizes some of the data and conclusions

of interest to the mathematics community.

The total number of S/E doctorates employed

in all sectors rose to 400,000 in 1985 at an annual

rate of 4.1% during the period 1983–1985. During

the same period, the number of mathematical

scientists employed grew about 1% per year and

about 3% per year from 1973-1983. The total

number of mathematical scientists employed was

16,000 in 1985.

The computer specialties continued to grow

at a faster rate than other occupations: between

1983 and 1985, the number of computer specialists

with doctorates grew at a rate of 10.9% per year,

more than twice the overall rate of 4.1% noted

above. For the period 1973–1983, the growth rate

was even larger, more than 16% per year.

There were several variations in growth rates

among the various work activities of S/E Ph.D.’s.

During 1983–1985, S/E Ph.D.’s reporting research

and development (R&D) as their primary activity

increased in number to 133,000 in 1985 at an

annual rate of 0.3%. The number engaged in
teaching grew at an annual rate of 1.6% during the

same period to 112,000 in 1985.

The largest growth rate among the various

work activities occurred in sales and professional

services. In this area, employment of S/E doc-

torates rose at an annual rate of 10.7% during

1983-1985 (from 30,000 to 36,500). This area has

also increased over the long-term: in 1973, 3.7%

of S/E doctorates were employed in sales and

professional services, compared to 9.1% in 1985.

In academia, the number of S/E doctorates

primarily engaged in R&D activities increased

during 1983–1985 at an annual rate of 5.4%

reaching 61,000 in 1985. During the same pe-

riod, the number primarily engaged in teaching

increased in 1985 to 110,000 at an annual rate of

increase of 1.8%. The report states that the more

rapid increases in R&D employment in academia

reflect “the growth in academic R&D expenditures,

which increased (in constant dollars) over 6% per

year during 1983–1985.” The report attributes the

relatively slow growth in the number reporting
teaching as a primary activity to “a number of factors,

including changes in demographic conditions and

enrollment patterns.”

During 1973–1985, the age profile of Ph.D.

scientists and engineers in academia changed

considerably. In 1973, 76% were under 50 years of

age and 27% were under 35. In 1985, 67% were

under 50 and only 13% were under 35. The report

says that “the shift toward older age groups re-

flects, in part, the relatively low growth in employ-

ment in educational institutions.”
The rate of growth in employment of S/E doctorates accelerated in academia, but slowed in industry. In academia, employment of this group increased during 1983–1985 at a rate of 3.9% per year, up from 2.4% per year during 1981–1983. By contrast, the annual rate of increase in industry during 1983–1985 was 5.3%, down from 7.0% during 1981–1983. However, the report states that “it is too early to determine whether [there has been] a trend reversal,” and notes that “during 1973–1983, there was a pronounced shift in relative employment from academia to industry.” For example, the proportion of S/E Ph.D.‘s in academia declined from 59% in 1973 to 53% in 1985, whereas the proportion employed in industry grew from 24% to 31% in the same time period. Also, employment of Ph.D. scientists and engineers in industry has been increasing more rapidly since 1973 than overall Ph.D. employment. There have also been changes in work activities in industry. In 1973, 45% of those employed in industry reported R&D as their primary activity. By 1985, the proportion had declined to 39%. The report states that a greater proportion of these people were engaged in “a combination of activities, including production and quality control as their primary activities.” The report also notes that “to a large extent the decline in the proportion reporting R&D as their primary activity reflects shifts in employment away from R&D-intensive fields.”
For Your Information

Kathleen Holmay is the Public Information Director of the Joint Policy Board for Mathematics' Office of Governmental and Public Affairs.

 Mathematics Awareness Week 1987: A Nationwide Success
Kathleen Holmay

Mathematics Awareness Week 1987 demonstrated that many mathematicians possess an impressive amount of public relations know-how and an interest in communicating the value of mathematics to university audiences as well as to the general public.

Prompted by a commitment to increasing public visibility for mathematics, the Joint Policy Board for Mathematics has sponsored Mathematics Awareness Week during the third week in April for the past two years. The 1986 focus was largely national with a presidential proclamation, a national TV spot, and consciousness-raising events held on Capitol Hill and elsewhere in Washington.

According to plan, 1987 took an entirely different focus and called for the inception of local events. Two mailings to department chairs, MAA governors and PIO's, legislative volunteers, and the JPBM Public Information Resource Committee yielded a flood of calls.

A Mathematics Awareness Week information kit (the same one that was sent to reporters) was mailed to every mathematician who expressed interest in increasing local visibility and awareness about mathematics.

The results were astounding! Members of the mathematics community came forward with a significant array of activities and accomplishments. The following list summarizes a few local efforts.

California
- A Mathematics Festival which was held at Sonoma State University included an exhibit, awards ceremony, public reception, a colloquium lecture, and an alumni reception. The Sonoma County Board of Supervisors also issued a proclamation.

Tennessee
- David Williams of Knoxville printed and distributed Mathematics Awareness Week bumper stickers to schools in his area.

New York
- A public lecture on "How Can We Reach Our Math and Science Students" was presented at Vassar by Hassler Whitney from the Institute for Advanced Study.

Ohio
- A lecture for undergraduates entitled "The Combinatorics of Soccer Balls" was presented by Terry McKee at Wright State University.
- A special college-wide symposium featuring three outside speakers was held at Denison University in Granville to celebrate the 300th anniversary of Newton's "Principia."

Missouri
- A thirty second television spot was prepared for cable and local stations by Southwest Missouri State University in Springfield, which also arranged a thirty minute television panel discussion on mathematics featuring spokespersons from local public schools and nearby colleges. Plus, the mayor of Springfield signed a proclamation for Mathematics Awareness Week.

Massachusetts
- A fractal exhibit, "Frontiers of Chaos," featuring the work of Heinz-Otto Peitgen, was held at the Boston Museum of Science.
- A symposium on the "Beauty of Otto Peitgen" was cosponsored by the M.I.T. Department of Mathematics and the Goethe Institute featuring presentations by Michael Barnsley, Robert Devaney, Benoit B. Mandelbrot, Heinz-Otto Peitgen, and Richard Voss.
- A proclamation was signed by Governor Dukakis, and the signing was covered by mathematician and Harvard core curriculum teacher, Michael Guillen, on WCVB-TV.

Arkansas
- The governor signed a statewide proclamation for Mathematics Awareness Week, and University of Arkansas students gave the governor a copy of "The Beauty of Fractals" by H. O. Peitgen and P. H. Richter. And not to be outdone, the state legislature passed a Joint Resolution for Mathematics Awareness Week.

Michigan
- A luncheon/reception, sponsored by Central Michigan University, featured Congressman William Schuette and members of the Mathematics Department who gave certificates of recognition to talented mathematics students from all surrounding high schools.
- A series of events was spearheaded by Wilfred Kaplan at the University of Michigan. A state proclamation was secured and signed in Lansing at an April 9 news conference. The University sponsored a special Saturday program for high school students with presentations, computer demonstrations, and films. Posters saying "Learn Math, It's Exciting, It's Beautiful" were printed and distributed to nearby schools and libraries. Mathematicians gave a demonstration at the Ann Arbor...
Hands-On Museum, a speech to the Chamber of Commerce, and addresses during local high school math classes. There was also an exhibit on campus about Isaac Newton.

- Two luncheons with programs on the role of mathematics were hosted for community officials, media, and other guests by Western Michigan University in Kalamazoo and Ann Arbor. Mayors of both cities also issued Mathematics Awareness Week proclamations.

Oklahoma
- A special afternoon program featuring Curtis McKnight, author of "The Underachieving Curriculum," was held at the University of Oklahoma where awards were also given to graduate students for outstanding teaching and scholarship.

Pennsylvania
- The opening of a new mathematics laboratory for experimental research was the highlight of Mathematics Awareness Week at Pennsylvania State University.

The Joint Policy Board for Mathematics is interested in getting even more mathematicians involved as spokespersons, as organizers, and as writers of informational material for Mathematics Awareness Week 1988. We are also interested in getting suggestions about the theme of the week.

The 1987 theme, "The Beauty and Challenge of Mathematics," was illustrated this year by using two visuals, a straight line drawing made by David Middleton in the 1940s (under the direction of G. D. Birkhoff) and a fractal created by Hans-Otto Peitgen in this decade.

Comments and suggestions on Mathematics Awareness Week are welcome. Address them to Jane Heckler, JPBM, 1529 18th St. NW, Washington, DC 20036.

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**MINIMAX METHODS IN CRITICAL POINT THEORY WITH APPLICATIONS TO DIFFERENTIAL EQUATIONS**

Paul H. Rabinowitz

(CBMS Regional Conference Series. Number 65 Supported by the National Science Foundation)

The book provides an introduction to min-max methods in critical point theory and shows their use in existence questions for nonlinear differential equations. An expanded version of the author's 1984 CBMS lectures, this volume is the first monograph devoted solely to these topics. Among the abstract questions considered are the following: the mountain pass and saddle point theorems, multiple critical points for functionals invariant under a group of symmetries, perturbations from symmetry, and variational methods in bifurcation theory.

The book requires some background in functional analysis and differential equations, especially elliptic partial differential equations. It is addressed to mathematicians interested in differential equations and/or nonlinear functional analysis, particularly critical point theory.

Contents

- An overview. The mountain pass theorem and some applications. Some variants of the mountain pass theorem.
- The saddle point theorem. Some generalizations of the mountain pass theorem. Applications to Hamiltonian systems. Functionals with symmetries and index theorems.
- Multiple critical points of symmetric functionals with constraints. Multiple critical points of symmetric functionals: the unconstrained case. Perturbations from symmetry. Variational methods in bifurcation theory.

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800-556-7774 to use VISA or MasterCard.
Military Research in the Soviet Union
I read with interest Bill Thurston’s letter (January 1987 Notices, pp. 39–44) advocating “no deal” with the military. The following is closely related to the issue concerned.

A friend of mine, L. E. Faibusovich (Leningrad, U.S.S.R.), has been employed for about ten years in a corporation which was involved both with civil and military projects. He worked in the nonmilitary department conducting research in mathematical systems theory and related topics. He published a number of papers in Russian journals and recently began publishing in international journals, see e.g., “Algebraic Riccati equation and symplectic algebra,” Int. J. Control 43:3(1986), 781–792.

In the end of 1985, L. E. Faibusovich was fired for his refusal to participate in military projects. He had a very hard time seeking another job. The only one he could find (recently) is not only menial but also prevents him from doing any research in the daytime and restricts his access to scientific libraries. I wish to urge the members of the Society to send L. E. Faibusovich (home address: Veselhaya 4-78, Leningrad 199106, U.S.S.R.) their reprints and preprints. Those who are going to visit Leningrad (U.S.S.R.), say, on a scientific exchange program are welcome to contact him personally.

R. Gurevič
University of Illinois
at Urbana-Champaign
(Received January 23, 1987)

Nomination by Petition
At its meeting in January, the AMS Council passed a resolution that would prohibit an individual from being nominated by petition more than twice in any ten-year period. Regardless of the intent of this motion, it will have the effect of denying candidacy to some members of the Society who might otherwise be nominated by petition. On behalf of the Executive Committee of the Association for Women in Mathematics, I urge the Council to rescind this resolution at the earliest possible opportunity.

Rhonda J. Hughes
Bryn Mawr College
President, Association for Women in Mathematics
(Received March 9, 1987)

EDITOR’S NOTE: The above was an item on the agenda for the April 25 meeting of the AMS Council. (See the AMS Reports and Communications section of this issue of Notices for a report of their action.)

Mathematics and the Military
Professor Robert Strichartz’s August letter expressed deep regret about the growing militarization of mathematics. He does however approve
the right of his colleagues "to sell their soul to whichever devil they choose." I offer two comments on the letter.

First, it should be observed that the letter is similar to many written twenty years ago during the Vietnam War era. Since then, the murder of tens of millions of people throughout Asia has cast some doubt on the moral equivalence of communist and democratic governments. Certainly, our previous allies in Vietnam never committed the crimes seen more recently there and in Cambodia and China. It may also be noted that the Berlin Wall still stands as a monument to academic and other freedom in East Europe.

Second, the desire of scientists to defend their country is far from a novel idea. In this regard, Sakharov is in a line stretching back to Archimedes, Laplace, Fourier, and Monge are Enlightenment examples. Our country also has a history of mathematical service for military applications. Veblen, Wiener, Von Neumann, and Ulam are prominent examples.

Fortunately there are enough scientists and other people who continue to defend our country.

David M. Weiss
Ridgewood, NJ
(Received March 4, 1987)

Encouraging Youth to Study Mathematics

I recently resigned from the Mathematical Sciences Education Board and the Committee of Mathematics of the Board of Mathematical Sciences, both affiliated with the National Research Council. I'm discouraged, but not because I think either body is lacking in talented, energetic and well-meaning professionals trying to do their best for mathematics. I'm worried that we are all making a fundamental mistake for which, in historical terms, we will pay dearly. Namely, what's happened to the sense of wonder and enjoyment that brought us all to mathematics in the first place?

When I was beginning high school, I thought it was "really neat" (that was the 50s) that somebody had invented algebra and that you could really do all those arithmetic problems at the same time, and do them forwards, backwards, or sideways. In weak moments, I even communicated this feeling to a few carefully chosen, safe friends. Lots of other kids did the same thing, even though we didn't get to know each other until much later. Probably some of our teachers didn't know much math, or, perhaps they communicated what they did know in "bad" or worn-out ways. But some of us were conditioned to accept and forgive that and to accept as gospel that the study of math was eternal and noble and even, perhaps, a source of sweet satisfaction. Not everybody did that, not even most of us. But, amidst all the usual interference caused by the flow of hormones and the desperate need to be liked by one's peers, there was room for those of us who liked and admired mathematics occasionally, without being given over to it by a consuming competitive urge or as the incarnate realization of some parent's misguided ambitions.

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Are there still school kids around who feel the same way? Are there enough of them to keep our subject alive and well into the twenty-first century? I'm frankly afraid that there aren't so many of those kids like most of us anymore. And I'm afraid that many of us are so taken with our own careers, and salaries, and by the search for the approval of our mathematical gods, that we don't have the time to find out what's going on with the next generation. We've got no time to listen and nothing to say to our mathematical sons and daughters, at least until they're almost grown up.

There certainly aren't many young people in the U.S. today who will choose a career in math, and there certainly isn't enough new scholarship and talent to keep our profession healthy. If it weren't that we continue to be able to buy talent and inspiration and scholarship from abroad, we'd already be in serious trouble. The minute that the U.S. becomes a less attractive place to live, relative to the homelands of many of our better mathematicians, we'll be in trouble.

Those of us who can listen and talk to kids need to spend time visiting schools to find out what's going on, and then we need to get in touch with our own basic inspiration so that teachers and students can share it with us.

Herbert Clemens
University of Utah
(Received March 6, 1987)

AMS-$\TeX$ Abstract Format

Several weeks ago I was lucky to receive from Associate Editor Patrick D. F. Ion of Mathematical Reviews a preliminary version of the AMS-$\TeX$ macro package for the Macintosh Plus. Part of it is the document style `amsart'—a preprint format, which I believe is relatively easy to use and does not require the 'average mathematician' to become a $\TeX$ wizard. I welcome this development and am looking forward to receiving the final version.

I wish now to go on suggesting to the AMS that a valuable service could be rendered to the members of the Society. Every member of the AMS who desires to present a paper is required to submit an abstract form. Within the past few years, the size of these abstract forms has increased. It is now so large that it does not fit in an ordinary typewriter. A number of mathematicians have switched from typewriters to computer-composed mathematical text, occasionally written with a mathematical text processor—recently so well described by Professor Richard Palais in columns on Mathematical Text Processing in these Notices. One of my problems following

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OPERATOR ALGEBRAS AND MATHEMATICAL PHYSICS

Palle E. T. Jorgensen and Paul S. Muhly, Editors

This volume contains papers presented at the University of Iowa 1985 Summer Conference in honor of H.-J. Borchers, N. M. Hugenholtz, R. V. Kadison, and D. Kastler and gives a systematic, up-to-date treatment of the fruitful interaction that the last two decades have brought between operator algebras and mathematical physics. Special attention is paid to an overview of the algebraic approach to quantum field theory, and, in particular, to quantum statistical mechanics. More than half the papers culminate with a presentation of new results which have not appeared previously in journals, and, with a few exceptions, these new results are presented with complete proofs.

This book is addressed to graduate students and researchers working in a broad spectrum of areas in mathematics and mathematical physics. Functional analysis, operator algebras, operator theory, differential geometry, cyclic cohomology, K-theory, and index theory are applied to questions in the quantum theory of fields and statistical mechanics. The individual papers are self-contained, but the reader should have some familiarity with the basic concepts of functional analysis and operator theory, although no physics background is assumed.

1980 Mathematics Subject Classifications: 46, 81, 82
ISBN 0-8218-5066-0, LC 86-32070
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QUESTIONS ARE WELCOMED from AMS members regarding mathematical matters such as details of, or references to, vaguely remembered theorems, sources of exposition of folk theorems, or the state of current knowledge concerning published or unpublished conjectures. This is not intended as a problem corner, except for occasional lists of problems collected at mathematical meetings.

REPLIES from readers will, when appropriate, be edited into a composite answer and published in a subsequent column. All answers received will be forwarded to the questioner.

QUERIES and RESPONSES should be typewritten if at all possible and sent to Queries Column, American Mathematical Society, P.O. Box 6248, Providence, Rhode Island 02940.

376. Gerhard F. Kohlmayr (Mathmodel Consulting Bureau, Glastonbury, CT 06033-3608). Morris Kline writes in his book Mathematics, the loss of certainty (Oxford University Press, New York, 1980), on page 261: “This result prompted Hermann Weyl to say that God exists because mathematics is undoubtedly consistent and the devil exists because we cannot prove the consistency.” On the other hand, Paul Lorenzen writes in his monograph Metamathematik (Bibliographisches Institut AG, Mannheim, 1962), on page 132: “Am originellsten ist, was der Mathematiker A. Weil dazu gesagt haben soll: ‘Gott existiert, weil die Mathematik widerspruchsfrei ist, und der Teufel existiert, weil wir es nicht beweisen können.’” I am inclined to believe that Lorenzen’s version has a better chance of standing up under scrutiny—although it’s possible in principle for both A. Weil and H. Weyl made these statements independently. I certainly would appreciate receiving a definite answer by a historian of mathematics.

377. Vasile Ion Istrătescu (Westring 331, 200 Kiel, West Germany). What is known about arithmetical properties of the values $\zeta(m)$ of the Riemann $\zeta$-function at natural numbers $m > 1$? (E.g., from the nature of $\zeta(2)$ one can deduce that the set of primes is infinite [see V. I. Istrătescu. Irrational numbers, selected topics]; or, the density of the set of squarefree integers exists and equals $\zeta(2)^{-1}$ [loc. cit.].)

Essentially self-contained, the book includes considerable discussion on a few of the deeper results, not merely a catalog of results. The author addresses pure mathematicians, especially combinatorialists and graduate students taking graph theory, as well as theoretical computer scientists. He assumes a mature familiarity with combinatorial methods and an acquaintance with basic graph theory.

In this book, an update of his 1978 book Extremal Graph Theory, the author focuses on the trend towards probabilistic methods. He demonstrates both the direct use of probability theory and, more importantly, the fruitful adoption of a probabilistic frame of mind when tackling main line extremal problems.
Acknowledgment of Contributions

The officers and the staff of the Society acknowledge with gratitude gifts and contributions received during the last past year. The inside cover of each issue of Mathematical Reviews carries the names of the sponsoring societies which support that publication. Contributing members of the Society paid dues of $126 or more. In addition to contributions to the AMS Research Fellowship Fund, there were a number of unrestricted general contributions. Also listed this year are AMS members who have contributed to ICM-86. Some of the contributors have asked to remain anonymous. All of these gifts provide important support for the Society's programs. The names listed below include those whose contributions were received during the year ending March 31, 1987.

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GROUP RINGS, CROSSED PRODUCTS AND GALOIS THEORY

Donald S. Passman

For readers with a basic graduate level background in algebra, this book provides a readable introduction to three major interrelated subjects of noncommutative algebra. The theme is the interplay between group theory and ring theory, dealing specifically with group rings, crossed products, and the Galois theory of rings. The author has carefully included most definitions, to keep the required background minimal. Each article contains a selection of results on the given topic, a limited number of proofs or sketches, and at least a few open problems.

Contents: Δ-methods in group rings; The Jacobson radical of group rings; Zero divisors in group rings; Polycyclic group rings; Crossed products of finite groups; Crossed products of infinite groups; Computing the symmetric ring of quotients: Galois theory and crossed products; Galois theory of prime rings; Rings and fixed rings.

1980 Mathematics Subject Classification: 16
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The Journal of the American Mathematical Society will be published quarterly, beginning in January 1988. It will contain research articles of the highest quality in all areas of pure and applied mathematics. Authors are requested to include introductions which will be accessible to research mathematicians in all fields.

There are no page charges for this journal.

Manuscripts may be submitted to any of the editors. The journal will be set by the AMS, using the \texttt{AMS-\TeX} macro package developed to simplify the use of \TeX for mathematics. If the manuscript is prepared using \texttt{AMS-\TeX}, the tapes or floppies can be used directly without need for further proofreading.
Council Nominations for Vice-Presidents and Members-at-Large

Two vice-presidents and five members-at-large of the Council will be elected by the Society in a contested election in the fall of 1987. The vice-presidents will serve for a term of two years effective January 1, 1988. The Council has nominated three candidates for the position. They are:

James G. Glimm
William P. Thurston
Barry Simon

The five members-at-large will serve for a term of three years. The Council nominated seven candidates. They are:

Richard W. Beals
Diana Frost Shelstad
Johnny E. Brown
Donald Solitar
Lawrence Craig Evans
Harold M. Stark
Albert Marden

The Council plans to name a fourth candidate for vice-president and additional candidates for member-at-large to bring their number to at least ten.

The deadline for petitions proposing additional nominations is July 6. Such proposals will not reach the Council for action by mail ballot until after that date.

President’s Candidates for the Nominating Committee 1988 and 1989

Four members of the Nominating Committee are to be elected in the fall of 1987. Continuing members are:

M. Salah Baouendi
Paul C. Fife
M. Salah Baouendi
Paul C. Fife

President G. D. Mostow has named four of the eight candidates for the other four places. They are:

Bernard M. Dwork
Robert Louis Griess
Carl Pomerance
William P. Ziemer

If nominations by petition have not appeared bringing the total number of candidates to at least eight, it will be brought up to eight by the President.

Bethlehem, Pennsylvania

Everett Pitcher
Secretary
1987 AMS Elections

Nominations by Petition

Vice-President or Member-at-Large

Two positions of vice-president and member of the Council ex officio for a term of two years are to be filled in the election of 1987. The Council intends to nominate four candidates. Nominations by petition as described in the box are acceptable.

Five positions of member-at-large of the Council for a term of three years are to be filled in the same election. Nominations by petition in the manner described in the box are acceptable. The Council has stated its intent to have at least ten candidates and will bring the number up to ten if the nominations by petition do not do so.

Petitions are presented to the Council, which, according to Section 2 of Article VII of the bylaws, makes the nominations. The Council of 23 January 1979 stated the intent of the Council of nominating all persons on whose behalf there were valid petitions. The Council of 20 January 1987 established a policy that, beginning with the interval 1987–1996, the Council intends to approve no more than two nominations by petition of the same individual in any ten year period.

Prior to presentation to the Council, petitions in aid of a candidate for the position of vice-president or of member-at-large of the Council must have at least 50 valid signatures and will bring the number up to ten if the nominations by petition do not do so.

Petitions are presented to the Council, which, according to Section 2 of Article VII of the bylaws, makes the nominations. The Council of 23 January 1979 stated the intent of the Council of nominating all persons on whose behalf there were valid petitions. The Council of 20 January 1987 established a policy that, beginning with the interval 1987–1996, the Council intends to approve no more than two nominations by petition of the same individual in any ten year period.

The Nominating Committee for 1988

The name of a candidate for member of the Nominating Committee may be placed on the ballot by petition. The candidate’s assent and petitions bearing at least 100 valid signatures are required for a name to be placed on the ballot. In addition, several other rules and operational considerations which are described in the box should be followed.

Rules and Procedures

Use separate copies of the form for each candidate for vice-president, member-at-large, or member of the Nominating Committee.

1. To be considered, petitions must be addressed to Everett Pitcher, Secretary, P.O. Box 6248, Providence, Rhode Island 02940, and must arrive by July 6, 1987.

2. The name of the candidate must be given as it appears in the Combined Membership List. If the name does not appear in the list, as in the case of a new member or by error, it must be as it appears in the mailing lists, for example on the mailing label of the Notices. If the name does not identify the candidate uniquely, append the member code, which may be obtained from the candidate’s mailing label or the Providence office.

3. The petition for a single candidate may consist of several sheets each bearing the statement of the petition, including the name of the position, and signatures. The name of the candidate must be exactly the same on all sheets.

4. On the facing page is a sample form for petitions. Copies may be obtained from the Secretary, however, petitioners may make and use photocopies or reasonable facsimiles.

5. A signature is valid when it is clearly that of the member whose name and address is given in the left-hand column.

6. The signature may be in the style chosen by the signer. However, the printed name and address will be checked against the Combined Membership List and the mailing lists. No attempt will be made to match variants of names with the form of name in the CML. A name neither in the CML nor on the mailing lists is not that of a member. (Example: The name Everett Pitcher is that of a member. The name E. Pitcher appears not to be. Note that the mailing label of the Notices can be peeled and affixed to the petition as a convenient way of presenting the printed name correctly.)

7. When a petition meeting these various requirements appears, the Secretary will ask the candidate whether he is willing to have his name on the ballot. Petitioners can facilitate the procedure by accompanying the petitions with a signed statement from the candidate giving his consent.
NOMINATION PETITION FOR 1987 ELECTION

The undersigned members of the American Mathematical Society propose the name of

______________________________

as a candidate for the position of (check one):

☐ Vice-President
☐ Member-at-Large of the Council
☐ Member of the Nominating Committee


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JOURNALS OF DISTINCTION

MATHEMATICAL REVIEWS

Since 1940, *Mathematical Reviews* has been the recognized reviewing and abstracting journal covering published mathematical research literature. Over 40,000 reviews or abstracts, by 12,000 international reviewers, are published each year. The reviews in each issue are arranged according to the 1980 Mathematics Subject Classification (1985 Revision). Subscriptions include annual author and subject indexes. Published monthly.

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CURRENT MATHEMATICAL PUBLICATIONS

This current awareness journal, which is published every three weeks, is a subject index of recent and forthcoming mathematical publications which have been classified by the editors of *Mathematical Reviews*. (The classification scheme used is the 1980 Mathematics Subject Classification (1985 Revision), published in the most recent annual index of *Mathematical Reviews*.) Each issue contains an author and key index; author and key indexes covering a half year are included in issues 9 and 17. Each issue contains a list of the serials represented in that issue and a separate listing of serial additions and changes, as well as a section containing the tables of contents of certain journals. Volume 19 is the 1987 volume.

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The eight hundred and thirty-fifth meeting of the American Mathematical Society will be held at Pacific Lutheran University in Tacoma, Washington, on Saturday, June 20, 1987. This meeting will be held in conjunction with the Pacific Northwest section of the Mathematical Association of America.

Invited Addresses

By invitation of the Committee to Select Hour Speakers for Far Western Sectional Meetings, there will be one invited one-hour address. The speaker is:

BRANKO GRÜNBAUM, University of Washington. The geometry of polyhedra, Saturday, 10:45 a.m.

Special Sessions

By invitation of the same committee, there will be one special session of selected twenty-minute papers. The topic of this session, the organizer, and final list of speakers is:

Polyhedral and planar graphs. MOSHE ROSENFELD, Pacific Lutheran University, Saturday, 1:30 p.m. The speakers are David W. Barnette, Peter Gritzmann, Branko Grünbaum, Nora A. Hartsfield, Victor L. Klee, Dragoslav S. Mihailović, Michael D. Plummer, and Moshe Rosenfeld.

Contributed Papers

There will also be one session for contributed twenty-minute papers.

MAA Program

The MAA program begins on Thursday with a short course on Discrete mathematics using difference equations, chaired by JAMES T. SANDEFUR, Georgetown University. On Friday the short course continues, and DONALD BUSHAW, Washington State University, will present an afternoon session titled Reflections on discrete mathematics in the first two years. At the Friday evening banquet being held at the Stillwood Inn, LEONARD GIULIANI, University of Texas at Austin, and President of the MAA, will deliver an address titled Pleasantries. At noon luncheon in the University Center Coffee Shoppe on Saturday, ROBERT JEWITT, Western Washington University, will speak on a topic to be announced.

Sessions for contributed papers will be held on Friday afternoon and Saturday morning.

Registration

The meeting registration desk will be located in the lobby of the Rieke Science Center. The desk will be open from 9:00 a.m. to 11:00 a.m. on Friday and from 8:00 a.m. to 10:00 a.m. on Saturday. The registration fees are $10 for members of the AMS or MAA, $16 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 on page 526 in the Salt Lake City meeting announcement in the April issue of Notices.

Accommodations

A block of dormitory rooms has been reserved on campus for participants. Rates are $8.65 per person per night, double occupancy and $12.65 per person per night, single occupancy. Participants should make reservations by writing to: Kenneth E. Batker, Department of Mathematics, Pacific Lutheran University, Tacoma, WA 98447. The deadline for receipt of reservations is June 5, 1987. Participants who prefer off-campus accommodations should make their own reservations directly with the hotel/motel of their choice. A listing of area motels, the distance from the university, and current rates are as follows. Rates do not include local taxes and are subject to change.

Apple Inn (6 blocks)
1811 South 76th Street, Tacoma, WA 98499
Telephone: 206-473-7100
Single: $29 Double: $34

Best Western Lakewood Motor Inn (6 blocks)
6125 Motor S.W., Tacoma, WA 98499
Telephone: 206-584-2212
Single: $38 Double: $40

Butler's Heritage Inn (6 blocks)
6802 South Sprague, Tacoma, WA 98499
Telephone: 206-475-5900
Single: $29 Double: $34

Nendel's Motel (5 blocks)
8702 South Hosmer, Tacoma, WA 98499
Telephone: 206-535-3100
Single: $39 Double: $45

Quality Inn (4 blocks)
9920 South Tacoma Way, Tacoma, WA 98499
Telephone: 206-588-5241
Single: $28 Double: $31

Tacoma South Travelodge (4 blocks)
9915 South Tacoma Way, Tacoma, WA 98499
Telephone: 206-588-6615
Single: $28 Double: $32

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Food Service

The cafeteria in the University Center will be open during both days of the meeting as well as weekends. In addition, a listing of local restaurants will be available at the registration desk.

Travel and Local Information

Tacoma is served by all major airlines. The Sea-Tac airport is situated approximately 30 miles north of Tacoma. The Capital Aeroporter provides round-trip shuttle service to Tacoma. Reservations are required and may be obtained by calling 206-572-9544. The one-way fare is $14 per person or $25 round trip.

Passengers traveling by train will arrive at the AMTRAK station at 1001 Puyallup Avenue, where Pierce Transit buses are available for travel to downtown. From there, transfer to bus #45 which stops at Pacific Lutheran University. If arriving by bus, the terminal is in downtown Tacoma; take bus #45 to the University.

Persons driving to the meeting should take Interstate route I-5 to Tacoma, take exit 127 and travel east on Highway 512 to Pacific Avenue (Parkland/Mount Rainier exit), turn south and continue approximately 12 blocks to 121st Street or Garfield Street. The campus is two blocks west of Pacific Avenue.

Parking

There are regular visitor parking lots on campus, close to the Rieke Science Center. Reserved lots may be used by visitors 5:00 p.m. to 7:00 a.m. and on weekends.

Weather

The weather in the Puget Sound area should be mild, sunny, and dry in June, affording spectacular views of Mount Rainier.

Joint Mathematics Meetings

August 5–8, 1987
University of Utah
Salt Lake City, Utah
Program of the Sessions

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 June 1987 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.

Thursday, June 18, 1987, 3:00 p.m.

MAA Short Course

Rieke Science Center, Room S-10

Friday, June 19, 1987, 9:00 a.m.

MAA Short Course

Rieke Science Center, Room S-10

Friday, June 19, 1987, 11:00 a.m.

MAA Business Meeting

Rieke Science Center, Leraas Lecture Hall

Friday, June 19, 1987, 1:10 p.m.

MAA Invited Address

1:10 - 2:10 Reflections on discrete mathematics in the first two years. DONALD BUSHAW, Washington State University

Friday, June 19, 1987, 2:20 p.m.

MAA Panel

Rieke Science Center, Leraas Lecture Hall

Friday, June 19, 1987, 3:30 p.m.

MAA Contributed Papers

Faculty House, Downstairs Lounge

Friday, June 19, 1987, 6:00 p.m.

Banquet and MAA Special Address

6:00 - No host reception
7:00 - Pleasantries. LEONARD GILLMAN, University of Texas, Austin

Saturday, June 20, 1987, 9:00 a.m.

MAA Contributed Papers

Rieke Science Center, Room S-20

Saturday, June 20, 1987, 11:00 a.m.

AMS Invited Address

11:00 - 11:50 (1) The geometry of polyhedra. BRANKO GRÜNBAUM, University of Washington (835-51-65)

Saturday, June 20, 1987, 12:00 p.m.

Luncheon and MAA Special Address

12:00 Title to be announced. ROBERT JEWITT, Western Washington Reserve University
Saturday, June 20, 1987, 1:30 p.m.

Special Session on Polyhedral and Planar Graphs

1:30 - 1:55 (2) Some comments on the d-step conjecture. VICTOR KLEE, University of Washington (835-99-15)

2:00 - 2:25 (3) A twisted quadrangulated torus. DRAGOSLAV LJUBIĆ, University of Washington (835-52-08)

2:30 - 2:55 (4) Minimal quadrangulations. NORA HARTSFIELD* and GERHARD RINGEL, University of California, Santa Cruz (835-05-03) (Sponsored by Gerhard Ringel)

3:00 - 3:25 (5) The toroidal analogue to Eberhard’s theorem. PETER GRITZMANN, University of Washington and Universität Siegen, Federal Republic of Germany (835-52-09)


4:00 - 4:25 (7) Coloring, covering and matching in 3-polytopal graphs. Some recent results. MICHAEL PLUMMER, Vanderbilt University (835-05-01)

4:30 - 4:55 (8) Two factors of simple 3-polytopes. MOSHE ROSENFELD, Pacific Lutheran University (835-05-06) (Sponsored by N. Christian Meyer, Jr.)

5:00 - 5:25 (9) Title to be announced. DAVID W. BARNETTE, University of California, Davis (835-99-16)

Saturday, June 20, 1987, 2:00 p.m.

Session on Contributed Papers

2:00 - 2:10 (10) On the computation of the Baker-Hausdorf-Campbell formula in terms of an alternate basis system. FRANCIS MURRAY, Duke University (835-99-14)


2:30 - 2:40 (12) A proportionality principle for partitioning problems. Preliminary report. THEODORE P. HILL, Georgia Institute of Technology (835-28-10)

2:45 - 2:55 (13) The shape of the strongest column is arbitrarily close to the shape of the weakest column. DAVID C. BARNES, Washington State University (835-34-12)

3:00 - 3:10 (14) Trace-class valued increasing functions. Preliminary report. PARFENY P. SAWOROTNOW, Catholic University of America (835-46-04)

3:15 - 3:25 (15) Probabilistic advantages in high sum wins contests. JOHN HILGERS, Michigan Technological University (835-60-13)

Hugo Rossi
Associate Secretary

Presenters of Papers

Numbers following the names indicate the speakers' positions on the program.

•AMS Invited lecturer
*Special session speaker

Barnes, D. C., 13
* Barnette, D. W., 9
Forsythe, W. L., 11
* Grünbaum, B., 5
* Hartsfield, N., 4
Hilgers, J., 15
Hill, T. P., 12
* Klee, V., 2
* Ljubić, D., 3
Murray, F., 10
* Plummer, M., 7
* Rosenfeld, M., 8
Saworotnow, P. P., 14

Salt Lake City, Utah

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Salt Lake City Meetings, August 5–8, 1987

Supplement to Announcement in April Notices

Please refer to the Preliminary Announcement for this meeting which appears on pages 519–543 of the April 1987 issue of Notices. The table of contents for the preliminary announcement is reproduced below for convenience.

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**AMS Special Sessions**

The deadline for submission of abstracts for special sessions was changed to May 8.

**AMS Contributed Papers**

The deadline for submission of abstracts for contributed papers has been changed to May 29.

**MAA Invited Address**

The title of the invited address to be given by PAUL J. STEINHARDT has been changed to Quasicrystals: A new state of matter.

The Preregistration/Housing Form, Summer List of Applicants Form, with instructions, and the Minicourse Preregistration Form can be found at the back of this issue.

Salt Lake City, Utah

Hugo Rossi
Associate Secretary

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**LIE ALGEBRAS AND RELATED TOPICS**

D. J. Britten, F. W. Lemire, and R. V. Moody, Editors

As the Proceedings of the 1984 Canadian Mathematical Society’s Summer Seminar, these papers focus on some recent advances in the theory of semisimple Lie algebras and some direct outgrowths of that theory. Of particular interest are notes for several courses presented at the meeting: an important survey article by R. Block and R. Wilson on restricted simple Lie algebras, a survey of universal enveloping algebras of semisimple Lie algebras by W. Bohro, a course on Kac-Moody Lie algebras by I. G. Macdonald, and a course on formal groups by M. Hazewinkel.

1980 Mathematics Subject Classifications:

17, 22


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The eight hundred and thirty-seventh meeting of the American Mathematical Society will be held at the University of Nebraska in Lincoln, Nebraska, on Friday afternoon, Saturday and Sunday mornings, October 30 - November 1, 1987.

Invited Addresses
By invitation of the Committee to Select Hour Speakers for Central Sectional Meetings, there will be four invited one-hour addresses. The speakers, their affiliations and titles, where available, are as follows:

CAROLYN S. GORDON, University of Pennsylvania and Washington University, St. Louis, When you can’t hear the shape of a manifold.

DAVID GRIFFEATH, University of Wisconsin, Madison, title to be announced.

DAVID W., MASSER, University of Michigan, Ann Arbor, Transcendence without transcendental numbers.

DAN VOAILESCU, University of California, Berkeley, title to be announced.

Special Sessions
By invitation of the same committee, there will be several special sessions of selected twenty-minute papers. The topics of the sessions, and the names and affiliations of the organizers, are as follows:

Operator algebras and operator theory, FRANK L. GILFEATHER, University of Nebraska, Lincoln.

Transformation groups in geometry, CAROLYN S. GORDON and QUO-SHIN CHI, Washington University.

Cellular automata and nonlinear dynamics, ERICA JEN, Los Alamos National Laboratory.

Finite geometries and combinatorial design, SPIROS D. MAGLIVERAS, EARL S. KRAMER, and DALE MESSNER, Department of Computer Science, University of Nebraska, Lincoln.

Semigroups and connections with automata and formal languages, JOHN C. MEAKIN and STUART W. MARGOLIS, University of Nebraska, Lincoln.

Diophantine problems, ROBERT E. TUBBS, University of Colorado, Boulder.

Commutative algebra and algebraic geometry, ROGER A. WIEGAND and BRIAN HARBOURNE, University of Nebraska, Lincoln.

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 form and submit it by July 27, 1987, three weeks before the deadline for contributed papers. In order that it may be considered for inclusion. Participants are reminded that a charge of $16 is imposed for retyping abstracts that are not in camera-ready form.

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 the Departments of Mathematics. Abstracts should be sent to the Editorial Department. American Mathematical Society, Post Office Box 6248, Providence, Rhode Island 02940, so as to arrive before the August 17, 1987, abstract deadline. Participants are reminded that a charge of $16 is imposed for retyping abstracts that are not in camera-ready form. Late papers will not be accommodated.

Registration
The registration desk will be open on Friday afternoon, October 30 and Saturday, October 31, at hours to be announced. The registration fees are $30 for members of the AMS, $45 for nonmembers, and $10 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 Salt Lake City meeting announcement on page 526 of the April issue of Notices.

Travel and Local Information
Information concerning travel, housing accommodations, food service, etc. will appear in the August issue of Notices.
The eight hundred and thirty-eighth meeting of the American Mathematical Society will be held at the University of California on Friday and Saturday, November 14–15, 1987. This meeting will be held in conjunction with the Southern California section of the Mathematical Association of America.

Invited Addresses
By invitation of the Committee to Select Hour Speakers for Far Western Sectional Meetings, there will be three invited one-hour addresses including:

HENRYK HECHT, University of Utah, title to be announced.

PAUL YANG, University of Southern California, title to be announced.

Special Sessions
By invitation of the same committee, there will be several special sessions of selected twenty-minute papers. The topics of the sessions, and the names and affiliations of the organizers, are as follows:

Differential geometry, ROBERT GREENE, University of California, Los Angeles, and H.-Y. CHOI, University of Utah.

Game theory, WILLIAM LUCAS, Claremont Graduate School.

Stochastic processes, SIDNEY PORT, University of California, Los Angeles, and RUTH WILLIAMS, University of California, San Diego.

Geometric Topology, JOHN WALSH, University of California, Riverside.

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 form and submit it by July 28, 1987, three weeks before the deadline for contributed papers, in order that it may be considered for inclusion. Participants are reminded that a charge of $16 is imposed for retyping abstracts that are not in camera-ready form.

It appears unlikely that late papers can be accommodated.

MAA Program
The MAA program will take place on Saturday and will include a luncheon. Additional information will be included in the August issue of Notices.

Petition Table
A petition table will be set up in the registration area. Additional information can be found in a box in the Salt Lake City meeting announcement on page 526 of the April issue of Notices.

Travel and Local Information
Information concerning accommodations, food service, and transportation will be included in the August issue of Notices.

Salt Lake City, Utah

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 the Department of Mathematics. Abstracts should be sent to the Editorial Department, American Mathematical Society, Post Office Box 6248, Providence, Rhode Island 02940, so as to arrive before the August 18, 1987, abstract deadline. Participants are reminded that a charge of $16 is imposed for retyping abstracts that are not in camera-ready form.

Hugo Rossi
Associate Secretary
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.

Salt Lake City, August 1987
Donald G. Aronson
Robert Finn
Edward W. Formanek
David Jerison
Stephen Kerchoff
Paul C. Roberts
Michael Starbird
Karen Vogtmann
Brian C. White
Robert Lee Wilson
Edward Witten
(AMS-MAA)

Salt Lake City, August 1987

Lincoln, October 1987
Carolyn S. Gordon
David Griffeath
David W. Masser
Dan Voiculescu

Los Angeles, November 1987
Henryk Hreht

Atlanta, January 1988
Constantine M. Dafermos
Philip J. Hanlon
Dusa McDuff
Roger D. Nussbaum
David P. Ruelle
Peter Clive Sarnak
Stephen W. Semmes

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 Notices went to the printer. The section below entitled Information for Organizers describes the timetable for announcing the existence of Special Sessions.

August 1987 Meeting in Salt Lake City
Associate Secretary: Hugo Rossi

Deadline for organizers: Expired
Deadline for consideration: May 8, 1987

Donald G. Aronson and Hans Othmer, Nonlinear evolution equations
Kenneth S. Brown, Geometric methods in group theory
Edward W. Formanek, Ring theory and invariant theory
Jacob Goodman and Erwin Lutwak, Discrete geometry and convexity
John M. Lee, Geometry and analysis on CR manifolds
Paul C. Roberts, Commutative algebra and algebraic geometry

October 1987 Meeting in Lincoln
Central Section
Deadline for organizers: Expired
Deadline for consideration: July 27, 1987
Frank Gilfeather, Operator algebras and operator theory
Carolyn Gordon and Quo-Shin Chi, Transformation groups in geometry
Erica Jen, Cellular automata and nonlinear dynamics
Spyros D. Magliveras, Earl Kramer, and Dale Mesner, Finite geometries and combinatorial design
John C. Meakin and Stuart W. Margolis, Semigroups and connections with automata and formal language
Robert Tubbs, Diophantine problems
Roger Wiegand and Brian Harbourne, Commutative algebra and algebraic geometry

November 1987 Meeting in Los Angeles
Far Western Section
Deadline for organizers: Expired
Deadline for consideration: July 28, 1987
Robert Greene, Differential geometry
William Lucas, Game theory
Sidney Port and Ruth Williams, Stochastic processes
John Walsh, Geometric topology

Fall 1987 Meeting
Eastern Section
No meeting will be held

Fall 1987 Meeting
Southeastern Section
No meeting will be held

January 1988 Meeting in Atlanta

Associate Secretary: W. Wistar Comfort
Deadline for organizers: Expired
Deadline for consideration: To be announced
Marlow Anderson and Todd Feil, Ordered algebraic systems
Alfred D. Andrew and John H. Elton, Banach space theory
Jean Bevis, George Davis, Frank Hall, Fred A. Massey, and Valerie Miller, Modern trends in matrix analysis and applications
Jack B. Brown and R. Daniel Mauldin, Measure theory and descriptive set theory
Shui-nee Chow and Roger D. Nussbaum, Nonlinear differential delay equations
Lewis A. Coburn, Toeplitz operators and geometry
Saber Elaydi, Stability of differential and integro-differential equations
Herbert Freedman and Paul Waltman, Applications of differential equations to population ecology

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Robert B. Gardner and Clyde Martin, *Geometry of nonlinear control systems*
Paul Hill, *Abelian groups*
Theodore P. Hill and Robert Kertz, *Discrete-time optimal stopping theory*
Henryk Iwaniec and Peter Clive Sarnak, *Analytic theory of automorphic forms and applications*
Michael S. Jacobson and Ronald Gould, *Graph theory*
H. W. Lenstra, Jr., *Algebraic number theory and algorithms*
Stephen R. Mahaney, *Structural complexity theory*
Lynn McLinden and Jay S. Treiman, *Optimization*
Roger D. Nussbaum, *Nonlinear differential delay equations*
A. G. Ramm, *Multidimensional inverse scattering, related problems in analysis and applications*
Dennis Stanton, *Combinatorics and group representations*
R. A. Zalik, *Total positivity and applications*

**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 Secretary. Others are spontaneously proposed by interested organizers or participants. Such proposals are welcomed by the Associate Secretaries.

The number of Special Sessions at a Summer or Annual Meeting is limited to twelve. Proposals, invited or offered, that are received at least nine months prior to the meeting are screened for suitability of the topic and of the proposed list of speakers, and for possible overlap or conflict with other proposals. (Specific deadlines for requesting approval for Special Sessions at national meetings are given above.) If necessary, the numerical limitation is enforced.

Proposals for Special Sessions should be submitted directly to the Associate Secretary in charge of the meeting (at the address given in the accompanying box). If such proposals are sent to the Providence office, addressed to *Notices*, or directed to anyone other than the Associate Secretary, they will have to be forwarded and may not be received before the quota is filled.

In accordance with an action of the Executive Committee of the Council, no Special Session may be arranged so late that it may not be announced in *Notices* early enough to allow any member of the Society who wishes to do so to submit an abstract for consideration for presentation in the Special Session before the deadline for such consideration.

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 later than the deadline 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.

The Society reserves the rights of first refusal for the publication of proceedings of any special session. These proceedings appear in the book _Contemporary Mathematics._

**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 announcement of the meeting at which the Special Session has been scheduled. Contributors should know that there is a limitation in size of a single special session that it is sometimes true that all places are filled by invitation. Papers not accepted for a Special Session are considered as ten-minute contributed papers.

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.
**APPROXIMATION THEORY**

Carl de Boor, Editor

The papers in this book, first presented at a 1986 AMS Short Course, give a brief introduction to approximation theory and some of its current areas of active research, both theoretical and applied. The first lecture describes and illustrates the basic concerns of the field. Topics highlighted in the other lectures include the following: approximation in the complex domain, N-width, optimal recovery, interpolation, algorithms for approximation, and splines, with a strong emphasis on a multivariate setting for the last three topics.

The book is aimed at mathematicians interested in an introduction to areas of current research and to engineers and scientists interested in exploring the field for possible applications to their own fields. The book is best understood by those with a standard first graduate course in real and complex analysis, but some of the presentations are accessible with the minimal requirements of advanced calculus and linear algebra.

1980 Mathematics Subject Classifications: 41. 30. 65
ISBN 0-8218-0098-1. LC 86-10846
ISSN 0160-7634
144 pages. August 1986
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Call For Topics For 1989 Conferences

Suggestions are invited from mathematicians, either singly or in groups, for topics of the various conferences that will be organized by the Society in 1989. The deadlines for receipt of these suggestions, as well as some relevant information about each of the conferences, are outlined below. An application form to be used when submitting suggested topic(s) for any of these conferences (except the Short Course Series) may be obtained by writing to the Meetings Department, American Mathematical Society, P.O. Box 6248, Providence, Rhode Island 02940, or telephoning 401-272-9500.

Individuals willing to serve as organizers should be aware that the professional meeting staff in the Society’s Providence office will provide full support and assistance before, during, and after each of these conferences. Organizers should also note that for all conferences, except Summer Research Conferences, it is required that the proceedings be published by the Society, and that proceedings of Summer Research Conferences are frequently published. A member of the Organizing Committee must be willing to serve as editor of the proceedings.

All suggestions must include (1) the names and affiliations of proposed members and chairman of the Organizing Committee; (2) a two- or three-page detailed outline of the subject(s) to be covered, including the importance, timeliness of the topic, and estimated attendance; (3) a list of the recent conferences in the same or closely related areas; (4) a tentative list of names and affiliations of the proposed principal speakers; (5) a list of likely candidates who would be invited to participate and their current affiliations; and (6) any other observations which may affect the size of the conference and the amount of support required. Any suggestions as to sites and dates should be made as early as possible in order to allow adequate time for planning. By action of the AMS Board of Trustees, the Meetings Department of the Society is responsible for the final selection of the site for each conference and for all negotiations with the host institution. Individuals submitting suggestions for the conferences listed below are requested to recommend sites or geographic areas which would assist the Meetings Department in their search for an appropriate site. In the case of Joint Summer Research Conferences in the Mathematical Sciences, a one-, two-, or three-week conference may be proposed.

Refer to the accompanying box titled Topics of Current and Recent Conferences for lists of topics.

Topics of Current and Recent Conferences

AMS Summer Institute

1985 – Algebraic geometry, organized by David Eisenbud of Brandeis University.
1986 – Representations of finite groups and related topics, organized by Jonathan L. Alperin of the University of Chicago.

AMS-SIAM Symposium on Some Mathematical Questions in Biology

1985 – Plant biology, organized by Robert M. Miura of the University of British Columbia.
1986 – Modeling circadian rhythms, organized by Gail A. Carpenter of Northeastern University.
1987 – Models in population biology, organized by Alan Hastings of the University of California, Davis.
1988 – Dynamics of excitable media, organized by Hans G. Othmer of the University of Utah.

AMS-SIAM Summer Seminar

1987 – Computational Aspects of VLSI Design with an Emphasis on Semiconductor Device Simulation, organized by Randolph Bank of the University of California, San Diego.
1988 – Computational solution of nonlinear systems of equations, organized by Eugene Allgower of Colorado State University.


**1989 AMS Summer Institute**

Summer Institutes are intended to provide an understandable presentation of the state of the art in an active field of research in pure mathematics, and usually extend over a one-week period. Dates for a summer institute must not overlap those of the Society's summer meeting, which at the time of this printing have not yet been determined; there should be a period of at least one week between them. Proceedings are published by the Society as volumes in the series Proceedings of Symposia in Pure Mathematics.

**Deadline For Suggestions:** August 15, 1987

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**1989 AMS-SIAM Summer Seminar**

The goal of the summer seminar is to provide an environment and program in applied mathematics in which experts can exchange the latest ideas and newcomers can learn about the field. Proceedings are published by the Society as volumes in the series Lectures in Applied Mathematics.

**Deadline For Suggestions:** August 15, 1987

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**1989 Joint AMS-IMS-SIAM Summer Research Conferences in the Mathematical Sciences**

These conferences are similar in structure to those held at Oberwolfach, and represent diverse areas of mathematical activity, with emphasis on areas currently especially active. Careful attention is paid to subjects in which there is important interdisciplinary activity at present. Topics for the series of one-week conferences, being held in 1987, are Categories in computer science and logic, Hamiltonian dynamical systems, Graphs and algorithms, Geometry of group representations, The connection between infinite dimensional and finite dimensional dynamical systems, Geometry of random motion, Crystal growth and pattern formation in phase transitions, Complex analytic dynamics, and Statistical inference from stochastic processes. If proceedings are published by the Society, they will appear as volumes in the series Contemporary Mathematics.

**Deadline For Suggestions:** February 1, 1988

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**Call for Topics for 1989 AMS Short Course Series**

The AMS Short Courses consist of a series of introductory survey lectures and discussions ordinarily extending over a period of one and one-half days starting immediately prior to the Joint Mathematics Meetings held in January and August each year. Each theme is a specific area of applied mathematics or mathematics used in the study of a specific subject or collection of problems in one of the physical, biological or social sciences, technology or business. Topics in recent years have been *Moments in Mathematics* (January 1987), *Approximation Theory* (January 1986), *Actuarial Mathematics* (August 1985), *Fair Allocation* (January 1985), *Environmental and Natural Resource Mathematics* (August 1984). Proceedings are published by the Society as volumes in the series *Proceedings of Symposia in Applied Mathematics*, with the approval of the Editorial Committee.

**Deadline for Suggestions:** Suggestions for the January 1989 course should be submitted by July 1, 1987; suggestions for the August 1989 course should be submitted by December 1, 1987.

Submit suggestions to: Professor Stefan A. Burr, Chairman, AMS Short Course Subcommittee, Department of Computer Sciences, CUNY, City College, New York, New York 10031.

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**COMBINATORICS AND ORDERED SETS**

*Ivan Rival, Editor*  
*Contemporary Mathematics, Volume 57*

For the mathematician interested in discrete mathematics, from the senior undergraduate to the professional level, this volume provides first-rate surveys of the important combinatorics themes in ordered sets.

These expository lectures, given at a 1985 Joint Summer Research Conference, cover a wide range of topics, which include the three-machine problem to illustrate the order-theoretic aspects of scheduling theory, the techniques used in settling the 'matching conjecture', the decomposition of ordered sets into few chains, the reorientation of graphs, the varied occurrences of the meet-distribution property, surveys techniques used in settling binary sorting problems, the formulation of a general view point for retraction, the survey of cutsets, and the role played by subdiagrams in ordered sets.

1990 Mathematics Subject Classifications: 06. 05  
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Special Meetings

This section contains announcements of meetings of interest to some segment of the mathematical public, including ad hoc, local, or regional meetings, and meetings or symposia devoted to specialized 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 both in this section and on the inside front cover. All meetings listed here, to the best of our knowledge, are open meetings and the public is invited to attend.

An announcement will be published in Notices if it contains the place, date, and the subject (when applicable); 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. In any case, if there is any application deadline with respect to participation in the meeting, this fact should be noted. All communications on special meetings should be sent to the Editor of 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, organizers of meetings are urged to submit information for these listings early enough to allow them to appear in more than one issue of Notices prior to the meeting in question. To achieve this, listings should be received in Providence six months prior to the scheduled date of the meeting.


*****

May 1987

26-28. Multiple-valued Logic, University of Massachusetts, Boston, Massachusetts. (January 1987, p. 133)
27-29. Institute of Mathematical Statistics Eastern Regional Meeting, Virginia Polytechnic Institute and State University, Blacksburg, Virginia. (February 1987, p. 359)
27-30. Seventh Great Plains Operator Theory Seminar, University of Kansas, Lawrence, Kansas. (February 1987, p. 360)
28-30. Annual Summer Meeting of the Canadian Mathematical Society, Queen's University, Kingston, Ontario, Canada. (February 1987, p. 360)
31-June 3. 1987 Annual Meeting, Statistical Society of Canada, Quebec City, Canada. (November 1986, p. 580)

June 1987

1-5. National Science Foundation-Conference Board of the Mathematical Sciences on Gauge Theory, Washington University, Saint Louis, Missouri. (April 1987, p. 550)
1-5. Ramanujan Centenary Conference, University of Illinois at Urbana-Champaign, Urbana, Illinois. (February 1987, p. 360)
1-6. Theorie de Hodge, Marseille, France. (February 1987, p. 360)
2-4. Artificial Intelligence, Expert Systems and Languages in Modelling and Simulation, Barcelona, Spain. Information: Symposium Secretariat, Institute of Cybernetics, Diagonal, 647, 2a planta, Barcelona 14, Spain, or C. Kubiakowski, Department of Computer Science, Rutgers University, New Brunswick, New Jersey 08903.
4-6. Computer Experimentation in Nonlinear Analysis, University of Missouri, Columbia, Missouri. (January 1987, p. 133)
4-6. Congress on Educational Computing in Mathematics, Università di Roma I, Roma, Italy. (February 1987, p. 399)
13. 11th Mathematics and the Microcomputer, Salisbury State College, Salisbury, Maryland. (February 1987, p. 360)
14. *Arithmetique des Systemes Codes*, Marseille, France. (February 1987, p. 360)
15. Singapore Group Conference Theory, National University of Singapore, Republic of Singapore. (March 1987, p. 360)
17. Congress on Educational Computing in Mathematics, Rome, Italy. (February 1987, p. 360)
20. Number Theory, Trace Formulas and Discrete Groups, Oslo, Norway. (January 1987, p. 133)
26. Mathematical Association of America's North Central Section Summer Seminar on Graph Theory and Linear Algebra, University of Minnesota, Duluth, Minnesota. (January 1987, p. 133)
27. National Science Foundation-Conference Board of Mathematical Sciences Regional Conference on Group Invariance Applications in Statistics, University of Michigan, Ann Arbor, Michigan. (April 1987, p. 550)
28. OR, Mathematics and the Microcomputer, Salisbury State College, Salisbury, Maryland. (February 1987, p. 360)
31. Workshop and Short Course on Stochastic Networks, University of Wisconsin, Madison, Wisconsin. (January 1987, p. 134)
32. Microprogram on Commutative Algebra, Mathematical Sciences Research Institute, Berkeley, California. (October 1985, p. 679)
33. Workshop on Molecular Structure and Dynamics, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, Minnesota. (February 1987, p. 361)
37. 17-23. Symmetry Methods in Differential Equations, Utah State University, Logan, Utah. (February 1987, p. 361)
38. 18-20. 855th Meeting of the AMS, Tacoma, Washington. (February 1987, p. 361)
41. 22-27. Mathematiques et Sciences Humaines, Marseille, France. (February 1987, p. 361)
44. 22-July 2. NSF Workshop on Extremes of Random Processes in Applied Probability, University of California, Santa Barbara, California. (April 1987, p. 550)
JULY 1987

July-August. Low Dimensional Topology Symposium, University of Sussex, Brighton, Great Britain. (August 1986, p. 654)


25-29. First Joint International Conference on Algebraic Groups and Related Finite Groups, Durham. Information: S. Donkin, School of Mathematical Science, Queen Mary College, Mile End Road, London E1 4NS, England.

AUGUST 1987


6-10. Sixth Conference on Graph Theory of China, People’s Republic of China. (August 1986, p. 654)

13. Georgia Topology Conference, Georgia Institute of Technology, Atlanta, Georgia. (January 1987, p. 134)


21. Mathematical and Statistical Developments in Evolutionary Theory, Université de Montréal, Montréal, Canada. (January 1987, p. 134)

28-29. Four-week Program on Robotics, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, Minnesota. (February 1987, p. 362)

4-7. Workshop on Generic Families of Vector Fields, Montréal, Canada. (February 1987, p. 362)


6-10 International Conference on Abelian Groups. Perth, Western Australia. (June 1986, p. 560)

6-11 International Conference on Statistical Inference from Stochastic Processes. black, New York.

6-12 Harmonic Analysis on Real and p-adic Groups. Bangor College, Bangor, Maine. (This conference has been postponed. For further details, see the announcement in August 14-27, 1988, in this section of Special Meetings.)

6-13 Sixth International Conference on Mathematical Modelling. Washington University, Saint Louis, Missouri. (February 1987, p. 362)

6-14 National Science Foundation-Conference Board of the Mathematical Sciences Regional Conference on Methods of Equivalence and Applications to Control Systems. Texas Tech University, Lubbock, Texas. (April 1987, p. 52)


6-16 Set Theory and its Applications-Conference at York University, Toronto, Canada. (January 1987, p. 13)

6-17 Sixteenth Conference on Stochastic Processes and their Applications. Stanford University, Stanford, California. (August 1986, p. 654)


6-19 International Conference on Computational Techniques and Applications, Sydney, Australia. (February 1987, p. 362)

6-20 International Conference on Rings, Modules, and Radicals. Hobart, Tasmania. (June 1986, p. 560)


6-23 Eighth International Congress of Logic, Methodology and Philosophy of Science. Moscow, Union of Soviet Socialist Republics. (January 1987, p. 134)

6-24 Meeting on Geometry of Banach Spaces. Mons. Information: C. Finet, Institut de Mathématique, Université de l'Etat à Mons, 15 avenue Maistria, 7000 Mons, Belgium.


6-27 Workshop on Lie Algebras of Prime Characteristic. The workshop will survey recent progress on the problem of classifying simple finite dimensional Lie algebras of prime characteristic and will explore topics which may be useful for future work on this and related problems.

6-28 Conference on Differential Equations "Equadiff '87", Democritus University of Thrace, Greece. (January 1986, p. 134)

6-29 International Conference on Web Geometry and Related Fields, Szeged University, Szeged, Hungary. (June 1986, p. 560)


6-31 Seventeenth European Meeting of Statisticians, Thessaloniki, Greece. Information: S. Kounias, Aristotle University of Thessaloniki, Department of Mathematics, Thessaloniki, Greece.


6-33 Meeting on Geometry of Banach Spaces, Mons, Belgium. (August 1986, p. 655)


6-36 Joint Sino-American Statistical Meeting, Beijing, China.


6-38 First International Conference on Statistical Data Analysis Based on the L1-Norm and Related Methods. University of Neuchâtel, Neuchâtel, Switzerland. (January 1987, p. 135)

6-39 Workshop on Artificial Intelligence for Natural Sciences, Torino, Italy. Call for Papers: Send title and extended abstract to the address below.


SEPTEMBER 1987

1-5. Conference on Mathematical Quantum Field Theory and Related Topics, Université de Montréal, Québec, Canada.


Information: F. Clarke, Director, Centre de recherches mathématiques, Université de Montréal, Cartes Postale 6128-A, Montréal, Québec, Canada H3C 3J7.

3-5. Satellite Meeting to the 46th Session of the International Statistical Institute, Kyoto, Japan. (April 1987, p. 552)

7-11. International Symposium on Harmonic Analysis, Centre Universitaire de Luxembourg, Luxembourg. (February 1987, p. 363)


8-16. Forty-sixth Biennial Session of the International Statistical Institute, Tokyo, Japan.


Information: C. Hayaishi, 213-11, Inokasira, 2-Tyone, Mitaka-Sei, Tokyo, Japan.


Information: R. Martin, National Bureau of Standards, Building 225, Room B266, Gaithersburg, Maryland 20899, 301-921-3545.


Information: V. Hernandez, Escuela Técnica Superior de Ingenieros Industriales, Universidad Politécnica, Apartado 1012, 46071 Valencia, Spain.

29-October 2. Fifth International Symposium on Data Analysis and Informatics, Versailles, France. (February 1987, p. 363)

OCTOBER 1987

October. 87 ICAR-International Conference on Advanced Robotics, Paris or Nice, France. (August 1986, p. 655)


Information: F. Zwieters, Program Chairman, Canadian Climate Centre, 4905 Dufferin Street, Downsview, Ontario, Canada M3H 5T4, 416-667-4963.


9-10. Sixth Annual Midwest Statistics Conference, University of Illinois, Urbana-Champaign, Illinois.

Information: S. Portnoy, Program Chair, Department of Statistics, University of Illinois, 1409 West Green Street, Urbana, Illinois 61801.

9-10. Thirteenth Annual Student Conference, Miami University, Oxford, Ohio. (April 1987, p. 553)


Information: The Conference Secretary (C.31), Mintel Private Bag X3015, Randburg 2125, South Africa.


Information: Conference Management Services, Post Office Box 5, 51 Sandycombe Road, Dun Laoghaire, Co Dublin, Ireland. Telephone: (+353-1) 452061 or (+353 1) 808025 if no reply.


Program: Lectures will be given by L. Evans, University of Maryland, J. Hale, Brown University, and H. Ettore, University of Iowa, and there will also be sessions for short contributed talks.

Information: G. Webb, Mathematics Department, Vanderbilt University, Nashville, Tennessee 37235, 615-322-4162.


Information: V. Sauter, School of Business, University of Missouri, 8001 Natural Bridge Road, Saint Louis, Missouri 63121-4490, 314-524-6261.


26-30. Third Asian Conference in Mathematical Logic, Beijing, China.

Information: Y. Dongping, Institute of Software, Academia Sinica, Post Office Box 8718, Beijing, China.


27-30. Computer Communication for Developing Countries '87, New Delhi, India.

Information: S. Ramani, Chairman, Program Committee on Computer Communication for Developing Countries '87, National Center for Software Technology, Chembur Cross Road, Number 9, Juhu, Bombay 400 066, India.

30-November 1. 837th Meeting of the AMS, Lincoln, Nebraska. (April 1987, p. 553)

Information: For further details, see the Meetings section of this issue of Notices.

NOVEMBER 1987

9-December 18. College on Riemann Surfaces, Trier, Italy. (February 1987, p. 363)

14-15. 838th Meeting of the AMS, Los Angeles, California (April 1987, p. 553)

Information: For further details, see the Meetings section of this issue of Notices.
DECEMBER 1987

30-31. Ramanujan Birth Centenary Year International Symposium on Analysis, Pune, India.
Information: N. Thakare, Professor of Mathematics and Head, Department of Mathematics, University of Poona, Pune-411007, India.

JANUARY 1988

4-8. Fifth Caribbean Conference in Combinatorics and Computing, University of the West Indies, Cave Hill.
Participants: R. Read (University of Waterloo) and R. Churchhouse (University of Cardiff).
Call for Papers: Participants wishing to present papers are asked to submit abstracts with completed registration cards by August 31, 1987. For more information, write to the address below.
Information: C. Cadogan, Department of Mathematics, University of the West Indies, Post Office Box 64, Bridgetown, Barbados, West Indies.

2-9. Joint Mathematics Meetings, Atlanta, Georgia. (April 1987, p. 553)
Information: H. Daly, American Mathematical Society, Meetings Department, Post Office Box 6248, Providence, Rhode Island 02940.

11-16. National Science Foundation-Conference Board of the Mathematical Sciences Regional Conference on Kaluza-Klein Theory, University of New Mexico, Albuquerque, New Mexico. (April 1987, p. 553)

Call for Papers: Submit one page typeset or typewritten abstract (500 words maximum) on any topic of relevance to the conference by September 30, 1987. Authors working outside of China should send abstracts to J. Miller, Numerical Analysis Group, Trinity College, Dublin 2, Ireland (telephone +353-1 613749). Those working in China should send their abstracts to G. Ben-yu, Department of Mathematics, Science and Technology University of Shanghai, Shanghai, China.

FEBRUARY 1988


MARCH 1988


APRIL 1988

17-30. The First Canadian Number Theory Society Conference, Banff, Alberta, Canada. (February 1987, p. 364)

MAY 1988

16-18. 1988 Mathematical Sciences Congress and 32nd Annual General Meeting of the Australian Mathematical Society, Canberra, Australia.
Information: C. Haywood, Department of Statistics, IAS, Australian National University, GPO Box 4, Canberra, ACT 2601, Australia.

Information: S. Pathmasiri, Faculty of Science, Kasetsart University, Bangkok 10900, Thailand.


30-June 3. Sixth International Conference on the Theory and Applications of Graphs, Western Michigan University, Kalamazoo, Michigan.
Conference Theme: Research Trends in Graph Theory.
Information: Directors, Sixth International Graph Theory Conference, Department of Mathematics and Statistics, Western Michigan University, Kalamazoo, Michigan 49008-3899.

JUNE 1988

20-24. Fifth International Conference on Boundary and Interior Layers: Computational and Asymptotic Methods, Shanghai, China.
Call for Papers: Submit one page typeset or typewritten abstract (500 words maximum) on any topic of relevance to the conference by September 30, 1987. Authors working outside of China should send abstracts to J. Miller, Numerical Analysis Group, Trinity College, Dublin 2, Ireland (telephone +353-1 613749). Those working in China should send their abstracts to G. Ben-yu, Department of Mathematics, Science and Technology University of Shanghai, Shanghai, China.

Conference Theme: Research Trends in Graph Theory.
Information: Directors, Sixth International Graph Theory Conference, Department of Mathematics and Statistics, Western Michigan University, Kalamazoo, Michigan 49008-3899.

JULY 1988


17-27. Ninth Congress of the International Association of Mathematical Physics, Swansea, Wales. (February 1987, p. 364)


AUGUST 1988

8-12. AMS Centennial Celebration, Providence, Rhode Island. (April 1987, p. 553)
Information: H. Daly, American Mathematical Society. Meetings Department, Post Office Box 6248, Providence, Rhode Island 02940.

9-12. International Symposium in Real Analysis, University of Ulster, Coleraine, Northern Ireland. (February 1987, p. 364)

Program: The Conference will explore recent advances in harmonic analysis on both real and p-adic reductive groups. The two week duration of the conference will allow for many valuable discussions and informal work sessions.

Invited Speakers: J. Bernstein, Harvard University, R. Howe, Yale University, W. Schmid, Harvard University, and D. Vogan, Massachusetts Institute of Technology.

Information: W. Barker, Chairman, Harmonic Analysis on Reductive Groups, Department of Mathematics, Bowdoin College, Brunswick, Maine 04011, 207-725-3571 or 207-772-3567.


Information: A. Kim, Department of Mathematics, The Pusan National University, Pusan 607, Republic of Korea.

21-27. Seventeenth International Congress of Theoretical and Applied Mechanics, Grenoble, France. (January 1987, p. 135)


JANUARY 1989

8-11. First Caribbean Conference on Fluid Dynamics, Saint Augustine, Trinidad, West Indies.


Call for Papers: Abstracts of about 500 words should be sent by January 31, 1988, to the Editorial Committee, CACOFD 89, Department of Mathematics, University of West Indies, Saint Augustine, Trinidad, West Indies.

Information: Additional information may be obtained from the Conference Chairman, H. Ramkissoon, at the above address.


Information: H. Daly, American Mathematical Society, Meetings Department, Post Office Box 6248, Providence, Rhode Island 02940.

JULY 1989

5-19. Microprogram on Noncommutative Rings, Mathematical Sciences Research Institute, Berkeley, California.

Information: Mathematical Sciences Research Institute, 1000 Centennial Drive, Berkeley, California 94720.

AUGUST 1989

28-September 1. Third International Conference on the Theory of Groups and Related Topics, Canberra, Australia.

Information: J. Cossey, Mathematics Department, Faculty of Science, Australian National University, GPO Box 4, Canberra, ACT 2601, Australia.

JANUARY 1990


Information: H. Daly, American Mathematical Society, Meetings Department, Post Office Box 6248, Providence, Rhode Island 02940.
FREE GROUP RINGS
Narain Gupta
(Contemporary Mathematics, Volume 66)

This book deals with some aspects of linear techniques in combinatorial group theory having their origin in the work of Wilhelm Magnus in the 1930s. The central theme is the identification and properties of those subgroups of free groups which are induced by certain ideals of the integral group rings of free groups. This subject has been developed extensively, and the author seeks to present, in contemporary style, a systematic and comprehensive account of some of its developments. Included in the book are a solution of the Fox subgroup problem and an up-to-date development of the dimension subgroup problem. Aimed at graduate students and researchers in combinatorial group theory, the book requires a familiarity with the general terminology of free groups and group rings.

Contents
Magnus embeddings and free differential calculus
Applications of Magnus embedding
Fox subgroups of free groups
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Serge Lang, Diophantine problems in complex hyperbolic analysis

Ron Livné, Cubic exponential sums and Galois representations

J.-P. Serre, Lettre à J.-F. Mestre

Joseph H. Silverman, A survey of the theory of height functions

Lucien Szpiro, Présentation de la théorie d’Arakelov

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NOETHERIAN RINGS AND THEIR APPLICATIONS
Lance W. Small, Editor
(Mathematical Surveys and Monographs, Volume 24)

Researchers in ring theory or allied topics, such as the representation theory of finite dimensional Lie algebras, will appreciate this collection of expository lectures on recent advances in ring theory and their applications to other areas. Five of the lectures were delivered at a conference on Noetherian rings at the Mathematisches Forschungsinstitut, Oberwolfach, in January 1983, and the sixth was delivered at a London Mathematical Society Durham conference in July 1983. The study of the prime and primitive ideal spectra of various classes of rings forms a common theme in the lectures, and they touch on such topics as the structure of group rings of polycyclic-by-finite groups, localization in noncommutative rings, and rings of differential operators. The lectures require the background of an advanced graduate student in ring theory and may be used in seminars in ring theory at this level.

Contents

J. T. Stafford, The Goldie rank of a module

Daniel R. Farkas, Noetherian group rings: An exercise in creating folklore and intuition

J. C. Jantzen, Primitive ideals in the enveloping algebra of a semisimple Lie algebra

Thomas J. Enright, Representation theory of semisimple Lie algebras

Jan-Erik Björk, Filtered Noetherian rings

R. Rentschler, Primitive ideals in enveloping algebras

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PROCEEDINGS OF THE 1985 MONTREAL CONFERENCE IN NUMBER THEORY
H. Kisilevsky and J. Labute, Editors
(Conference Proceedings of the Canadian Mathematical Society, Volume 7)

This volume contains the proceedings of the Canadian Mathematical Society's Summer Seminar in Number Theory, held in June 1985 at the Loyola Campus of Concordia University. Directed at advanced graduate students and research mathematicians, this book requires a background of graduate study in number theory and modular functions and will provide readers with a survey of current research topics in number theory. The papers range over a variety of areas, including local and global number fields, L-series, modular forms, Iwasawa theory, and arithmetic algebraic geometry. Included are papers by H. Stark and B. Gross based on lectures they gave at the conference. In his paper, Stark presents a new point of view regarding modular forms and Dirichlet series. Gross's paper presents a geometric approach to Eichler's arithmetic theory of definite quaternion algebras and to Waldspurger's results on the central critical values of L-series.

Contents
T. Chinberg, Intersection theory and capacity theory on arithmetic surfaces
R. Crew, $L$-functions of $p$-adic characters and a geometric "main conjecture"
E. de Shalit, Making class field theory explicit
P. Feit, The poles and residues of Eisenstein series on symmetric domains
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B. Gordon, Algebraic cycles of higher weight and modular forms
D. Goss, Analogies between global fields

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D. Hayes, Real quadratic function fields
J. Minardi, Iwasawa modules for \( Z_p \)-extensions of number fields
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T. Orloff, Another proof of the Kronecker limit formula
P. Philippon, Indépendence et groupes algébriques
D. Ramakrishnan, Arithmetic of Hilbert-Blumenthal surfaces
D. Rohrlich, Elliptic curves and values of L-functions
M. Rosen, Fourier series and special values of Hecke L-functions
K. Rubin, \( p \)-adic L-functions and descent on non-CM elliptic curves
H. M. Stark, Modular forms and related objects
L. Tatevossian, Canonical liftings of formal modules
O. Taussky, Integral matrices in algebraic number theory

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PROCEEDINGS OF THE 1986 ANNUAL SEMINAR ON OSCILLATION, BIFURCATION, AND CHAOS
F. V. Atkinson, W. F. Langford, and A. B. Mingarelli, Editors
(Conference Proceedings of the Canadian Mathematical Society, Volume 8)

The year 1986 marked the sesquicentennial of the publication in 1836 of J. Sturm’s classic memoir on boundary value problems for second order equations. In July 1986, the Canadian Mathematical Society sponsored the International Conference on Oscillation, Bifurcation, and Chaos, held at the University of Toronto. This volume contains the proceedings of this conference.

Distinguished by the breadth of its perspective and by its treatment of applications, this volume contains nearly 50 papers on parametrized linear and nonlinear differential equations. The book is divided, as the conference was, into two parts. Part 1, in honor of the Sturm sesquicentennial, deals with spectral theory and oscillation theory for linear second order equations, eigenvalue problems and their extensions, including Hamiltonian systems. Part 2 is devoted to nonlinear differential equations and addresses problems in multiparameter bifurcation theory, normal forms, invariant tori, and chaotic dynamics. Several of the papers deal with bifurcations in delay-differential equations.

In addition, both parts of the book present significant applications of recent theoretical advances to such diverse fields as population dynamics, chemical reactions, geology, and mechanical engineering. In this way, these proceedings reflect the dynamics of the conference, which fostered mutually beneficial interactions between linear and nonlinear theory as well as between theory and applications.

Requiring a basic knowledge of the qualitative theory of differential equations, this book is aimed at mathematicians and students working in any area of differential equations, as well as researchers interested in applying recent results in oscillation and bifurcation theory to other disciplines. Readers will gain a broad perspective on current research in this area from both the Sturmian and dynamical systems points of view, as well as an understanding of new results useful for application and of directions for future research.

1980 Mathematics Subject Classifications:
34, 58, 35, 70, 92, and others
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THEORY AND APPLICATIONS OF DIFFERENTIABLE FUNCTIONS OF SEVERAL VARIABLES
S. M. Nikol’skii, Editor
(Proceedings of the Steklov Institute, Volume 170)

This collection of papers deals with various problems on the theory of differentiable functions.

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of several real variables and its application to partial differential equations. Topics considered are: embedding theorems, applications for Sobolev spaces, separation theorems, denseness of smooth compactly supported functions, approximation numbers for imbedding operators, Calderón-Zygmund singular operators, as well as the solutions of a variety of boundary value problems and Cauchy problems.

Contents

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Faĭn, B. L., Extension of functions in anisotropic Sobolev spaces

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FOURTEEN PAPERS TRANSLATED FROM THE RUSSIAN

L. A. Aksent'ev et al.
(American Mathematical Society Translations, Series 2, Volume 136)

The papers in this collection range over a variety of topics, including integral representations, complex analysis, differential equations, and functional analysis.

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L. A. Aksent'ev and I. R. Nezhmetdinov, Sufficient conditions for univalence of certain integral transforms
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V. A. Kasimov, A property of Hilbert modules and Fredholm operators over $C^*$-algebras

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HANDLEBODY DECOMPOSITIONS OF COMPLEX SURFACES

John Harer, Arnold Kas, and Robion Kirby

This book gives handlebody descriptions of the elliptic surfaces over $P^1$, including the Kummer surface. The authors derive handlebody decompositions of the surfaces obtained by performing logarithmic transforms to these elliptic surfaces. They pay special attention to the Dolgachev surfaces $D(p,q)$.

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POLES AND RESIDUES OF EISENSTEIN SERIES FOR SYMPLECTIC AND UNITARY GROUPS

Paul Feit

This book evaluates Dirichlet series which arise in studying Fourier coefficients of certain Eisenstein series for a wide variety of groups. The author uses this technical calculation to prove many theorems about automorphic forms, finding generalizations of the classical theorems for series of small weights. He also locates all of the poles of an Eisenstein series of arbitrary weight.

Directed at specialists in the theory of automorphic forms in several variables, the book demonstrates that for certain algebraic groups, there is a family of Eisenstein series whose Fourier expansions can be thoroughly described. Thus it suggests that such a "good" family of Eisenstein series must exist for other groups as well.

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PATH FUNCTIONS AND GENERALIZED BASIC HYPERGEOMETRIC FUNCTIONS

Kevin W. J. Kadell

In this book the author obtains path functions and their basic properties by extending the constructive theory of partition generating functions developed by Sylvester, Durfee, Andrews, and others. Giving infinite families of generalizations of some basic hypergeometric summation formulas, he provides an interesting trade-off between complexity and rate of convergence. He adds one free parameter to the $q$-analog of the limiting form of Jackson's theorem to generalize that result.
Personal Items

Mikhail Gromov of the School of Mathematics, Institut des Hautes Etudes, Bures-sur-Yvette, France, was appointed as the initial holder of the Second Sid W. Richardson Foundation Regents Chair in Mathematics at the University of Texas at Austin from April 10 to May 1, 1987.

Desmond B. Sawyer was elected an Honorary Member of the New Zealand Mathematical Society in 1986.

Kazak Yosida was awarded the Mauro Picone Prize by the Facoltà di Scienze Matematiche Fisiche e Naturali della Università degli Studi di Roma “La Sapienza” in 1986.

Deaths

Jacob Benson, of Asbury Park, New Jersey, died November 21, 1986, at the age of 65. He was a member of the Society for 37 years.

Julian Blau, Professor Emeritus of Antioch College, Ohio, died March 10, 1987, at the age of 62. He was a member of the Society for 49 years.

John O. Chellevold, Professor Emeritus of Wartburg College, Waverly, Iowa, died December 30, 1986, at the age of 80. He was a member of the Society for 39 years.

Harold Grad, Professor at New York University, Courant Institute, died November 17, 1986, at the age of 63. He was a member of the Society for 39 years.

Peter Henrici, Professor at North Carolina University and at the Eidgenössische Technische Hochschule, Zurich, died March 13, 1987, at the age of 63. He was a member of the Society for 33 years.

Eliy S. Johnson, Washington, DC, died March 1, 1987, at the age of 71. He was a member of the Society for 31 years.

Clarence B. Lindquist, of Washington, DC, died February 2, 1987, at the age of 73. He was a member of the Society for 47 years.

William K. McNabb, of Dallas, died September 14, 1986, at the age of 71. He was a member of the Society for 20 years.

Charles H. Randall, of the University of Massachusetts, Amherst, died March 10, 1987, at the age of 59. He was a member of the Society for 24 years.

Alexander Zabrodsky, of Hebrew University, Jerusalem, Israel, died November 20, 1986, at the age of 45. He was a member of the Society for 22 years.

THE LEGACY OF SONYA KOVALEVSKAYA

Linda Keen, Editor

Sonja Kovalevskaya was a distinguished mathematician and considered by her contemporaries to be among the best of her generation. Her work, ideas and approach to mathematics are still relevant today, while her accomplishments continue to inspire women mathematicians.

The academic year 1985-86 marked the 15th anniversary of the Association for Women in Mathematics and the 25th anniversary of the Mary Ingraham Bunting Institute of Radcliffe College, Harvard University; both organizations that have enhanced women’s role in mathematics. These two occasions provided a framework for a Kovalevskaya celebration, which included a symposium at Radcliffe College, and special sessions at the the AMS meeting in Amherst, Massachusetts, both in October 1985. The papers in this collection were drawn from those two events.

The first group of papers contains background material about Kovalevskaya’s life and work, including a discussion of how she has been perceived by the mathematical community over the last century. The rest of the papers contain new mathematics and cover a wide variety of subjects in geometry, analysis, dynamical systems and applied mathematics. They all involve in one form or another Kovalevskaya’s main areas of interest - differential equations and mathematical questions arising from physical phenomena.

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Visiting Mathematicians

The list of visiting mathematicians includes both foreign mathematicians visiting in the United States and Canadians visiting abroad. Note that there are two separate lists.

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<td>8/87 - 5/88</td>
</tr>
<tr>
<td>Tam, Su-Shih (China)</td>
<td>University of Wisconsin-Madison</td>
<td>Combinatorics</td>
<td>12/87 - 3/88</td>
</tr>
<tr>
<td>Tang, Shouwen (People's Republic of China)</td>
<td>University of California, Santa Barbara</td>
<td>Optimization Discrete Mathematics in Computer Science</td>
<td>1/87 - 12/87</td>
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</table>

697
MULTIPARAMETER BIFURCATION THEORY

Martin Golubitsky and John M. Guckenheimer, Editors

This 1985 AMS Summer Research Conference brought together mathematicians interested in multiparameter bifurcation with scientists working on fluid instabilities and chemical reactor dynamics. This proceedings volume demonstrates the mutually beneficial interactions between the mathematical analysis, based on genericity, and experimental studies in these fields. Various papers study steady state bifurcation, Hopf bifurcation to periodic solutions, interactions between modes, dynamic bifurcations, and the role of symmetries in such systems. A section of abstracts at the end of the volume provides guides and pointers to the literature.

The mathematical study of multiparameter bifurcation leads to a number of theoretical and practical difficulties, many of which are discussed in these papers. The articles also describe theoretical and experimental studies of chemical reactors, which provide many situations in which to test the mathematical ideas. Other test areas are found in fluid dynamics, particularly in studying the routes to chaos in two laboratory systems, Taylor-Couette flow between rotating cylinders and Rayleigh-Benard convection in a fluid layer.

1980 Mathematics Subject Classification: 58, 34, 76
ISBN 0-8218-5060-1, LC 86-8106
ISSN 0271-4132
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Prepayment required. Order from AMS, P.O. Box 1571, Annex Station, Providence, RI 02901-9930, or call 800-556-7774 to use VISA or MasterCard.
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.

Michael C. Mackey (1989) has been appointed and John M. Rinzl (1989) has been reappointed to the AMS-SIAM Committee on Mathematics in the Life Sciences by Presidents G. D. Mostow (AMS) and Charles William Gear (SIAM). Other members of the committee are Kenneth L. Lange (1987), Hans G. Othmer (1988), Alan S. Perelson (1987), and Richard E. Plant (1988).

Reports of Past Meetings
The March 1987 Meeting in Honolulu

The eight hundred and thirty-second meeting of the American Mathematical Society was held at the University of Hawaii in Honolulu, March 26-28, 1987.

Invited Addresses. By invitation of the Committee to Select Hour Speakers for Far Western Sectional Meetings, there were two invited addresses. MARTIN SCHARLEMANN of the University of California, Santa Barbara, spoke on Applications of naive graph theory to the topology of 3-manifolds; he was introduced by Terry Lawson. EDWARD A. BERTRAM of the University of Hawaii spoke on Some combinatorial problems in finite groups; he was introduced by Ronald L. Graham.

Special Sessions. By invitation of the same committee, there were seven special sessions of selected twenty-minute papers. The topics of these sessions, the names and affiliations of the organizers, and lists of the speakers are as follows:

Algebraic topology. CHRISTOPHER J. ALL-DAY and R. LITTLE, University of Hawaii. The speakers were Bohumil Cenkl, James F. Davis, W. Y. Hei, S. Kwasik, Mikiya Masuda, William W. Menasco, John Oprea, and S. Warer.


Complex function theory. GEORGE CSORDAS, Wayne Smith, and DAVID STEGENGA, University of Hawaii. The speakers were Patrick Ahern, Sheldon Axler, George Csordas, Carl H. Fitzgerald, Simon Hillel and, Aimo Hinkkanen, Keiji Izuchi, Boris Korenblum, Frank D. Lesley, Joseph Miles, Bruce Palka, John Rossi, Donald Sarason, W. Schneider, Joel H. Shapiro, Daniel Shea, Wayne Smith, Charles S. Stanton, Kenneth Stephenson, David C. Ullrich, and Richard S. Varga.


Combinatorics. JERROLD J. GRIFFS, University of South Carolina, Columbia. The speakers were Brian Alspach, R. L. Graham, Katherine Heinrich, Povil Hell, I. D. MacDonald, Bojan Mohar, J. B. Nation, W. T. Trotter, and Victor K. Wei.

Set theory and its applications. THOMAS JECH, Pennsylvania State University. The speakers were James E. Baumgartner, Andreas R. Blass, Matthew Foreman, Marcia J. Groszek, Alexander S. Kechris, Richard Laver, D. A. Martin, Karel Prikry, and W. Hugh Woodin.

Differential geometry. PETER LI, University of Utah, RICHARD M. SCHOEN, and S.-T. YAU, University of California, San Diego. The speakers were Robert L. Bryant, Hyeong I. Choi, Robert E. Greene, Karsten Grove, R. Hamilton, Meinhard E. Mayer, Mario J. Micallef, Frank Morgan, S. Walter Wei, Brian White, and S.-T. Yau.

There were also two sessions for contributed ten-minute papers, of seven and four papers respectively.

The undersigned associate secretary would like to thank R. Torretto of the MAA for suggesting this meeting and Adolf Mader of the University of Hawaii who served very effectively as the local organizer.

Hugo Rossi
Salt Lake City, Utah
Associate Secretary

The Council Meeting in Newark

The Council met on 25 April 1987 at 7:00 PM in the Monmouth Room of the Hilton Gateway Hotel in Newark, NJ. President Mostow was in the chair.

The Council considered some issues related to federal funding of research in mathematics. Specifically, they considered the recommendations
from the Committee on Science Policy published in the Notices for April on p. 448. These recommendations concerned themselves with the two motions entertained by the Business Meeting of 22 January 1987 as detailed in the Notices for February on pp. 398-399. The Council adopted a plan that is enunciated on p. 615 of this June issue.

The Council agreed that the Society administer two prizes from the Fredkin Foundation concerned with automatic theorem proving [ATP], known as the Milestone Prize “for foundational work in ATP” and the Current Prize “for ongoing work in ATP” that shows promise.”

The Council changed the name of the research fellowship awarded by the Society to the American Mathematical Society Centennial Fellowships, effective beginning in 1988.

The Council noted that each paper in the Proceedings will carry a notation of the name of the editor who accepts it.

The Council received the information that Irwin Kra had been elected to the Executive Committee for a term of four years.

The Council received a request to rescind its statement of intent not to entertain more than two nominations by petition of the same individual in any ten year period. The Council did not rescind its previous action.

The Council nominated William Browder as candidate for the position of president-elect in the election of 1987.

The Council nominated candidates for vice-president and member-at-large in the same election. Election to these offices carries Council membership. See p. 663 for the names and related issues.

The Council nominated the following candidates for positions in uncontested election in 1987.

Associate Secretary

Andy Roy Magid
Lance W. Small
Frederick W. Gehring

Trustee

Richard S. Palais

Committee to Monitor Problems in Communication

Bethlehem, Pennsylvania

Evetter Pitcher

Secretary

Statistics on Women Mathematicians Compiled by the AMS

At its August 1985 meeting, the Council of the AMS approved a motion to regularly assemble and report in Notices information on the relative numbers of men versus women in at least the following categories: membership in the AMS; invited hour addresses at AMS meetings; speakers at special sessions at AMS meetings; and members of editorial boards of AMS journals.

It was subsequently decided that this information would be gathered by determining the sex of the individuals in the above categories based on name identification and that additional information on the number of Ph.D.’s granted to women would also be collected using the AMS Annual Survey. Since name identification was used, the information for some categories necessitated the use of four classifications:

- Male - names that were obviously male;
- Female - names that were obviously female;
- Unknown - names that could not be identified as clearly male or female (i.e., only initials given); and
- Foreign - foreign names that could not be identified as clearly male or female.

The following is the second reporting of this information. Updated reports will appear annually in Notices.

<table>
<thead>
<tr>
<th>Members of the AMS Residing in the U.S.</th>
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<tr>
<td>Male:</td>
<td>10,904</td>
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<td>Female:</td>
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<th>Invited Hour Address Speakers at AMS Meetings (1977-1986)</th>
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<td>Male:</td>
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<tr>
<td>Female:</td>
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<tr>
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<td>5</td>
</tr>
<tr>
<td>Foreign:</td>
<td>36</td>
</tr>
<tr>
<td>Total checked:</td>
<td>379</td>
</tr>
</tbody>
</table>
NONCOMMUTATIVE HARMONIC ANALYSIS
Michael E. Taylor

This book explores some basic roles of Lie groups in linear analysis, with particular emphasis on the generalizations of the Fourier transform and the study of partial differential equations. It began as lecture notes for a one-semester graduate course given by the author in noncommutative harmonic analysis. It is a valuable resource for both graduate students and faculty, and requires only a background with Fourier analysis and basic functional analysis, plus the first few chapters of a standard text on Lie groups.

The basic method of noncommutative harmonic analysis, a generalization of Fourier analysis, is to synthesize operators on a space on which a Lie group has a unitary representation from operators on irreducible representation spaces. Though the general study is far from complete, this book covers a great deal of the progress that has been made on important classes of Lie groups.

Unlike many other books on harmonic analysis, this book focuses on the relationship between harmonic analysis and partial differential equations. The author considers many classical PDEs, particularly boundary value problems for domains with simple shapes, that exhibit noncommutative groups of symmetries. Also, the book contains detailed work, which has not previously been published, on the harmonic analysis of the Heisenberg group and harmonic analysis on cones.

Contents
Some basic concepts of Lie group representation theory. The Heisenberg group. The unitary group. Compact Lie groups. Harmonic analysis on spheres. Induced representations, systems of imprimitivity, and semidirect products. Nilpotent Lie groups. Harmonic analysis on cones. SL(2, R), SL(2, C), and more general Lorentz groups. Groups of conformal transformations. The symplectic group and the metaplectic group. Spinors. Semisimple Lie groups

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The Mathematical Reviews Editorial Committee invites applications and recommendations for two-year appointments as Associate Editor of MR, to commence as soon as possible, but no later than the summer of 1987. Applications will be welcomed from persons taking leave from other positions, and in particular from tenured faculty members who could take leave to come to MR for two years.

The MR office is located in Ann Arbor, Michigan, adjacent to the campus of the University of Michigan, and the editors enjoy many faculty privileges at the university. At present, MR employs eleven editors, about a dozen consultants, and over fifty noneditorial personnel. It produces Mathematical Reviews and Current Mathematical Publications and various indexes, as well as the online service MathSci. The responsibilities of Associate Editors fall primarily in the day-to-day operations of classifying articles and books, assigning these items to reviewers, and editing the reviews when they are returned. Other responsibilities evolve in accordance with the individual's experience and capabilities. At this time, no particular area of mathematical specialization is sought, although strength in applied areas is desirable. Considerable breadth in mathematics, rather than special skill, is sought. A reading knowledge of two main foreign languages is important, but not essential. (Russian and Chinese are especially desirable.)

Those interested in combining a sabbatical or other leave with a part-time or full-time appointment as an Associate Editor should write for further details. The twelve-month salary is negotiable, and will be commensurate with the experience applicants bring to the position. Retirement, insurance plans, and other fringe benefits are similar to those in universities. Of special importance is a policy providing a study leave after at least two years. This amounts to three months of full pay for each two years spent as Editor.

Applications (including curriculum vitae, bibliography, data on experience, and names and addresses of three references) and recommendations should be sent to Dr. R. G. Bartle, Executive Editor, Mathematical Reviews, P. O. Box 8604, Ann Arbor, MI 48107. Telephone 313-996-5250. Those interested in applying for this position are urged to inquire immediately.

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SOUTHERN ILLINOIS UNIVERSITY
AT EDWARDSVILLE
Chair, Mathematics and Statistics

Applications and nominations are invited for the position of Chair of the Department of Mathematics and Statistics. Applicants should have a doctorate in Mathematics or Statistics, a record of successful teaching and research in Mathematics or Statistics, strong leadership and communication skills, and a commitment to promoting research, teaching, and other creative activities.

The Department of Mathematics and Statistics is part of the School of Sciences, which includes departments of Biology, Chemistry, Physics, and Computer Science. At present, the Department has 16 faculty members, 80 undergraduate majors and 40 master's candidates.

The University occupies a beautiful 2600 acre campus in the St. Louis metropolitan area. Current enrollment is approximately 10,000 students, the majority of whom are residents of the area.

Initial screening of candidates will begin May 1, 1987, and continue until the position is filled. The earliest appointment date is September 1, 1987. Rank and salary will be commensurate with qualifications and experience. Send nominations and letters of application to the Chair Search Committee, Department of Mathematics and Statistics, Southern Illinois University at Edwardsville, Edwardsville, IL 62026-1653. SIUE is an Affirmative Action/Equal Opportunity Employer.

Computer Science: Applications are invited for a tenure track position at the assistant professor level starting in the 1987-88 academic year. Candidates must have a Ph.D. and a commitment to computer science education and demonstrated research ability in computer science and graduate courses, and develop an appropriate area of research.

The University offers the B.S. degree in Computer Science within the School of Arts & Science, and a B.S.E. degree in the School of Engineering & Architecture. The candidate will play an active role in the development of both programs. Send resume and three references to Dr. Mario Casarella, Search Committee Chair, Computer Science Program, 201 Pangborn Building, Catholic University of America, Washington, D.C. 20064. An Equal Opportunity/Affirmative Action Employer.

McGill University
Department of Mathematics and Statistics

The Department of Mathematics and Statistics at McGill University wishes to sponsor a strong candidate for the Natural Sciences and Engineering Research Council of Canada (NSERC) 1987-88 University Research Fellowship Competition. These Fellowships are five year research positions (with a review in the third year), in the nature of Research Assistant Professorships, and carry a teaching load of at most one course throughout the academic year. Applicants should have shown some substantial research ability beyond their doctoral thesis. They should be Canadian Citizens or landed immigrants by November 1, 1987.

Interested candidates should send their curricula vitae to:

Professor M. Herschorn, Chairman
Department of Mathematics and Statistics
McGill University
805 Sherbrooke Street West
Montreal, Quebec, Canada
H3A 2K6

They should arrange for at least two letters of reference from competent referees to be sent directly to the same address. All documentation should reach the department by September 11, 1987. The department will make its recommendations to NSERC early in October 1987. NSERC will announce its decision in March 1988.

TENNESSEE STATE UNIVERSITY
Department of Physics, Mathematics, and Computer Science

Full-time tenure track positions in Mathematics beginning August 17, 1987 in the areas of Topology and/or Analysis. Applicants must have a Ph.D. (or near) in Mathematics, teaching experience, a strong interest in research, and a desire to help build a strong graduate program. Applicants should send vita, three letters of recommendation and transcripts to Dr. Raymond Richardson, Head, Applications accepted until positions are filled. Inquiries should be directed to: Dr. Raymond Richardson, Head, Department of Physics, Mathematics and Computer Science, Tennessee State University, 3500 John A. Merritt Boulevard, Nashville, Tennessee 37203. An equal opportunity/affirmative action employer.
Applications are invited for the position of Chairperson of the Department of Mathematics and Statistics at the University of Vermont. The university is seeking a mathematician or statistician with a strong research background, a record of leadership and a commitment to excellence in teaching. The new chairperson will be instrumental in shaping research mathematics, both within the university and in the State of Vermont, by developing the existing strengths of the department as well as fostering interaction with the other scientific and engineering groups in the university, the medical school and industry. This task is expected to include the implementation of a Ph.D. program and building in the areas of analysis and applied mathematics.

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 greater Burlington area supports a concentration of hi-tech industries. The University currently enrolls approximately 8,150 undergraduates and 1,075 graduates. It has a strong reputation for undergraduate education and is committed to further developing its graduate and research programs.

Candidates must possess a doctorate in Mathematics or Statistics, and although all fields of specialization are welcome, preference will be given to candidates in areas best suited to enhance the department's development as outlined above. Salary is competitive and will be commensurate with the candidate's experience. Nominations of, and applications from, qualified female and minority candidates are especially invited. The position will be available beginning June 1, 1988. The target date for receiving applications is August 31, 1987; however, applications will be accepted until the position is filled. Nominations and applications (including a resume listing names, addresses, and phone numbers of at least three references) should be submitted to:

Professor Kenneth I. Golden, Chair
Mathematics and Statistics Search Committee
Office of the Dean. College of Engineering and Mathematics
123 Votey Building
University of Vermont
Burlington. VT 05405

Applications are invited from Greek-speaking mathematicians who are also Greek citizens, holding the Ph.D degree, for a position at the level of associate professor. The position is for people working in the area of partial differential equations and their applications. Applications should contact Prof. S. Pnevmatikos, University of Thessaloniki, School of Technology, Division of Math. Sciences, Thessaloniki, Greece.

The Australian National University
Applications are invited from suitably qualified women and men for appointment to the position of POST-DOCTORAL FELLOW/RESEARCH FELLOW in the DEPARTMENT OF MATHEMATICS RESEARCH of Mathematics (Head: Professor D. W. Robinson (FAA))Algebras. Semigroups and Mathematical Physics: Partial Differential Equations and Geometry: Lie Groups and Algebraic Groups: Ordinary Differential Equations and Control Theory: Functional Analysis Group Theory. Closing date: 31 July 1987. Salary will be in accordance with qualifications and experience within the range: Postdoctoral Fellow Grade 1 at a fixed point A$24,013-A$27,507 p.a.; Research Fellow A$27,859-A$35,600 p.a. Appointment will be Research Fellow normally up to three years with the possibility of extension to maximum of five years. Postdoctoral Fellow normally two years, with the possibility of extension to maximum of three years. Separate maternity leave and assistance with travel available. The University reserves the right not to make an appointment or to make an appointment by invitation at any time. Applicants should quote the reference number when submitting applications to R.V. Duls.Registrar. CODE Box 4. Canberra. ACT. 2601 Australia THE UNIVERSITY IS AN EQUAL OPPORTUNITY EMPLOYER.

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Department of Mathematics
University of Alberta
Edmonton, Alberta, Canada
Applications are invited for two tenure-track positions in Numerical Analysis at the Assistant Professor level starting September 1. 1987. Requirements are a Ph.D. and proven ability or demonstrated potential for research and teaching in either numerical partial differential equations and computations or computational fluid dynamics. Experience in scientific computing (for one of the positions) or computational algorithms, (for the other position). Current salary range is from $31,612 (Canadian) per annum depending upon qualifications. Send vitae and arrange for three letters of reference to be sent to: Professor H. I. Freedman, Acting Chairman, Department of Mathematics, University of Alberta, Edmonton, Canada, T6G 2G1. The University of Alberta is an equal opportunity employer, but in accordance with Canadian Immigration requirements. priority will be given to Canadian citizens and permanent residents. Closing date for applications is July 31, 1987. Please refer to The American Mathematical Monthly (A.M.M.) 91 (5) May 1984. An AA/EEO employer.
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The Department of Mathematics at the University of Victoria is seeking strong candidates for the 1987-89 NSERC University Research Fellowship competition. These research fellowships have an initial term of up to five years and are awarded on a competitive basis by the National Sciences and Engineering Research Council of Canada. The duties of a University Research Fellow will include teaching one course per term in Mathematics and related areas in the graduate program. Areas of research activity include discrete mathematics, functional analysis, differential equations and complex analysis, and operator theory. Applicants should submit, not later than August 1, 1987, a curriculum vitae and the names of at least three referees.

Dr. C.R. Miers, Chairman
Department of Mathematics
University of Victoria
Victoria, B.C. V8W 2Y2

The University of Victoria offers equal employment opportunities to qualified male and female applicants. NSERC regulations require that University Research Fellowship nominees be Canadian citizens or landed immigrants at the time of nomination.

Purdue University Calumet
Hammond, Indiana 46323

Department of Mathematical Sciences

Assistant Professor, beginning August 24, 1987; tenure-track upon completion of Ph.D. Requirements: Ph.D. or A.B.D. in Mathematics or Computer Science, statistics background and teaching experience preferred. Application deadline is July 1, 1987. Send letter of application, vita, and three letters of recommendation to: Richard L. Yats, Search Committee Chairperson, at the above address. Purdue University Calumet is an Equal Opportunity, Affirmative Action Employer.

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E. H. Connell

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Sylow and Lie end the preface with these words: “Abel a eu de grands successeurs; mais pour qui veut continuer dans la voie frayée par lui, il sera toujours profitable de remonter à la source même: les immortelles Oeuvres d’Abel”.

(“Abel has had great successors, but for those who want to continue on the road which he has paved, it will always be profitable to go back to the sources: the immortal works of Abel”).

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Annals of Mathematics Studies, 114
Paper: $15.00. Cloth: $35.00

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\TeX\ is a state-of-the-art typesetting program developed by Professor Donald E. Knuth at Stanford University. \TeX\ is being supported as a standard language for mathematical typesetting by the American Mathematical Society. The AMS has developed a special package of mathematical typesetting tools for \TeX, called \texttt{AMS-\TeX}, which greatly simplifies the setting of complex mathematical formulas.

\TeX\ inputs a standard ASCII computer file, and generates output which can be directed to print on a variety of devices, from dot matrix printers to laser printers to phototypesetters. This entire ad was typeset using \texttt{PC\TeX} and printed on the Corona LP300 Laser Printer.

At the recent AMS Conference in New Orleans, we asked mathematicians to suggest complex formulas which we then typeset using \TeX. The following was submitted by Bernard Harris, Department of Statistics, University of Wisconsin.

\begin{align*}
P_{m,n,p}(S = j) &= \binom{N}{n}^{-m} \binom{N}{j} \sum_{i=0}^{N-j} (-1)^i \binom{N-j}{i} \\
&\quad \cdot \left( \sum_{i=0}^{j+1} (1-p)^i \binom{N-j-l}{n-i} \binom{j+l}{i} \right)^m, \\
&\hspace{1cm} j = 0, 1, \ldots, N; \\
m = 0, 1, \ldots; \\
N = 0, 1, \ldots; \\
n = 0, 1, \ldots, N; \\
0 \leq p \leq 1.
\end{align*}

\texttt{PC\TeX} A full \TeX82, version 1.5, including INITEX, \texttt{LT\TeX} (a full featured document preparation system), \texttt{LT\TeX} User's Guide, \texttt{AMS-\TeX}, and Mike Spivak's \texttt{PC\TeX} Manual and VANILLA macro package. \$249.

Drivers are available for the following dot matrix printers: Epson FX, RX and LQ printers, IBM Graphics Printer, and the Toshiba 1340, 1350, P351 printers. Each driver includes over 230 \TeX and \LaTeX fonts. $100. each.

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The Joy of \TeX

A Gourmet Guide to Typesetting
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M. D. SPIVAK, Ph.D.

The \texttt{AMS-\TeX} is the user-friendly user's guide for \texttt{AMS-\TeX}, an extension of \texttt{\TeX}, Donald Knuth’s revolutionary program for typesetting technical material. \texttt{AMS-\TeX} was designed to simplify the input of mathematical material in particular, and to format the output according to any of various preset style specifications.

There are two primary features of the \TeX system: it is a computer system for typesetting technical text, especially text containing a great deal of mathematics; and it is a system for producing beautiful text, comparable to the work of the finest printers.

Most importantly, \TeX's capabilities are not available only to \TeXperts. While mathematicians and experienced technical typists will find that \TeX allows them to specify mathematical formulas with greater accuracy and still have great control over the finished product, even novice technical typists will find the manual easy to use in helping them produce beautiful technical \TeX.

This book is designed as a user’s guide to the \texttt{AMS-\TeX} macro package and details many features of this extremely useful text processing package. Parts 1 and 2, entitled "Starters" and "Main Courses," teach the reader how to typeset most normally encountered text and mathematics. "Sauces and Pickles," the third section, treats more exotic problems and includes a 60-page dictionary of special \TeXniques.

Exercises sprinkled generously through each chapter encourage the reader to sit down at a terminal and learn through experimentation. Appendixes list summaries of frequently used and more esoteric symbols as well as answers to the exercises.
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J. L. Selfridge, Editor

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This index is ordered by the subject classification scheme in effect during 1968-72, with the 1962-67 articles having been reclassified as necessary. Under each heading, the subject index lists all items reviewed with either primary or secondary classification in the given area. Beside the first author's name are listed the title of the book or article, the language in which it was written, and its MR review number. Cross-references to these entries are provided for secondary authors. A list of entries and references by key words follows the authors in each classification.

To locate a given item, this subject index may be used in conjunction with the appropriate, previously published author indexes, which provide full bibliographic information as well as the reviewer's name.

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INTEGRAL GEOMETRY

Robert L. Bryant, Victor Guillemin, Sigurdur Helgason, and R. O. Wells, Jr., Editors

The topic of integral geometry is not as well known as its counterpart, differential geometry. However, research in integral geometry has indicated that this field may yield as equally deep insights as differential geometry has into the global and local nature of manifolds and the functions on them. In 1984, an AMS-IMS-SIAM joint summer research conference on integral geometry was held at Bowdoin College. This volume consists of papers presented there.

The papers range from purely expository to quite technical and represent a good survey of contemporary work in integral geometry. Three major areas are covered: the classical problems of computing geometric invariants by statistical averaging procedures; the circle of ideas concerning the Radon transform, going back to the seminal work of Funk and Radon around 1916-1917; and integral-geometric transforms which are now being used in the study of field equations in mathematical physics. Some of these areas also involve group-representation theoretic problems.

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**Near-term career goals:**

**Significant achievements or projects, including role:**

**Honors and offices:**

**Other (e.g., paper to be presented at THIS meeting):**

**Selected titles of papers, reports, books, patents:**

<table>
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<th>Degree</th>
<th>Year</th>
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**Employment History:**

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<th>Previous</th>
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<td>Position:</td>
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<td></td>
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<tr>
<td>Years:</td>
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</table>

**Desired Position:**

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<th>Duties:</th>
</tr>
</thead>
</table>

**Available months/year: Location:**

**Salary:**

**References (Name and Institution):**

**Citizenship:**

**I plan to attend the Summer Meeting:**

Yes [ ] No [ ]

---

**SUMMARY STRIP**

<table>
<thead>
<tr>
<th>Family Name</th>
<th>First Name</th>
<th>Mailing Address</th>
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**Address (cont'd.):**

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<th>State &amp; Zip Code</th>
<th>Specialties</th>
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</table>

**Career objectives:**

- Highest Degree:  
  - Yr.  
  - Institution

**Most recent employer:**

**Desired duties:**

**Available months/year:**

**Sessions:**

---

719
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August 5-8, 1987

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<thead>
<tr>
<th>Number</th>
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<th>Organizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Applied Mathematics via classroom experiments</td>
<td>Herbert R. Bailey</td>
</tr>
<tr>
<td>2.</td>
<td>Using computer spreadsheet programs in calculus, differential equations, and combinatorics</td>
<td>Donald R. Snow, Howard Anton, David P. Kraines, Vivian Kraines, Joan P. Wyzkoski, Harley Flanders, Solomon A. Garfunkel</td>
</tr>
<tr>
<td>3.</td>
<td>A microcomputer linear algebra course using Linear-Kit</td>
<td>Vivian Kraines</td>
</tr>
<tr>
<td>4.</td>
<td>A survey of educational software</td>
<td>Howard Anton, David P. Kraines</td>
</tr>
<tr>
<td>5.</td>
<td>Introduction to computer graphics</td>
<td>Howard Anton, David P. Kraines</td>
</tr>
<tr>
<td>6.</td>
<td>A calculus lab course using MicroCalc</td>
<td>Vivian Kraines</td>
</tr>
<tr>
<td>7.</td>
<td>For all practical purposes</td>
<td>Howard Anton, David P. Kraines</td>
</tr>
</tbody>
</table>

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June 1  

August 4  

August 4  

July 31  

August 3  

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<table>
<thead>
<tr>
<th>Registration by mail prior to 6/1</th>
<th>AF Meeting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint Meetings fee</td>
<td>$59</td>
</tr>
<tr>
<td>MAA 25-year Banquet ticket(s)</td>
<td>$16</td>
</tr>
<tr>
<td>$90</td>
<td>$117</td>
</tr>
</tbody>
</table>

*All full-time students currently working toward a degree or diploma qualify for the student registration fee, regardless of income. The unemployed status refers to any person currently unemployed, actively seeking employment, and who is not a student. It is not intended to include persons who have voluntarily resigned from their latest position. 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.

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First Middle  
Nickname for badge: (optional)  

2)  

3)  

4)  

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6) Name of spouse  

7) Number of children  

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Options:  

Dates:  

Residence Hall:  

Room Type  

Amount paid:  

CC ( ) Check ( )
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<thead>
<tr>
<th>Accommodation</th>
<th>Single Room</th>
<th>Double Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austin Hall (a/c)</td>
<td>$13.00</td>
<td>$19.00</td>
</tr>
<tr>
<td>Ballif Hall (no a/c)</td>
<td>$12.00</td>
<td>$17.00</td>
</tr>
<tr>
<td>Van Cott Hall (no a/c)</td>
<td>$12.00</td>
<td>$17.00</td>
</tr>
</tbody>
</table>

Number of nights ______

II. I will arrive on _______ at ___ a.m./p.m. and depart on _______ at ___ a.m./p.m.

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Telephone number: (area code)

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(airline/flight/number)

Airport on _______ at ___ a.m./p.m.

( ) I plan to drive to the meeting.

Note: This additional information is being requested in order to assist the university's housing office in planning for heavy arrival times.
Application for Membership 1987

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35 Partial differential equations
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47 Operator theory
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