# **PROCEEDINGS**

OF THE

# AMERICAN MATHEMATICAL SOCIETY

#### EDITED BY

P. R. HALMOS ELDON DYER M. H. HEINS FRITZ JOHN

ALEX ROSENBERG GEORGE WHAPLES

#### WITH THE COÖPERATION OF

WILLIAM BROWDER AVNER FRIEDMAN W. J. LEVEQUE

Y. W. CHEN ANIL NERODE PETER UNGAR

C. W. CURTIS F. W. GEHRING MICHEL KERVAIRE S. M. SHAH

VOLUME 14, NUMBER 5 OCTOBER, 1963

PUBLISHED BY THE AMERICAN MATHEMATICAL SOCIETY PROVIDENCE, RHODE ISLAND

# Journals Published by the American Mathematical Society

# Bulletin of the American Mathematical Society

This journal is the official organ of the Society. It reports official acts of the Society and the details of its meetings. It contains some of the officially invited addresses presented before the Society, reviews of advanced mathematical books, research problems and a department of research announcements.

One volume of six numbers is planned for 1963. The subscription price is \$7.00. The prices of back volumes, insofar as they are available, are as follows: vols. 1–27, 29 (1894–1921, 1923), \$23.50 each; vol. 28 (1922), \$19.70; vols 30–35 (1924–1929), \$20.000 each; vols. 36–55 (1930–1949), \$28.00 each; vols. 56–68 (1950–1962), \$14.00.

# Proceedings of the American Mathematical Society

This journal is devoted entirely to research in pure and applied mathematics, and is devoted principally to the publication of original papers of moderate length. A department called Shorter Notes was established in 1961. The purpose of this department is to publish very short papers (maximum length, 1 printed page) of an unusually elegant and polished character, for which there is normally no other outlet.

unusually elegant and polished character, for which there is normally no other outlet. The definitive new proof of an important and long-known theorem, an illuminating new fact, or an interesting lemma used for proof of a theorem in a different field are examples of subjects suitable for publication in this department.

Articles for insertion in the PROCEEDINGS should be typewritten, double spaced. The maximum length of an acceptable paper is 8 printed pages. (A page of the PROCEEDINGS contains an average of 400 words; a typewritten page contains an average of 300 words. A rough rule of thumb, accordingly, is that under 10 typewritten pages is probably within the allowed limit, but over 11 typewritten pages is probably not.) The greatest possible care should be taken in preparing the manuscript and if necessary The Manual for Authors published by the Society should be consulted. The authors should keep a complete copy.

The authors should keep a complete copy.

Papers in algebra and number theory should be sent to Alex Rosenberg, Department of Mathematics, Cornell University, Ithaca, New York or George Whaples, Department of Mathematics, Indiana University, Bloomington, Indiana; in probability, real variables, logic, and foundations to P. R. Halmos, Department of Mathematics, University of Michigan, Ann Arbor, Michigan, in abstract analysis to either matics, University of Michigan, Ann Arbor, Michigan; in abstract analysis to either P. R. Halmos or Alex Rosenberg; in geometry and topology to Eldon Dyer, Eckhart Hall, University of Chicago, Chicago 37, Illinois; in other branches of analysis, applied mathematics, and all other fields to M. H. Heins, Department of Mathematics, University of Illinois, Urbana, Illinois or Fritz John, Institute of Mathematical Sciences, 4 Washington Place, New York 3, New York. All other communications to the editors should be addressed to the Managing Editor, Alex Rosenberg. Inquiries from authors regarding reprints and changes of address for mailing galley proof should be sent to the Editorial Department, American Mathematical Society, 190 Hope Street, Providence 6. Rhode Island.

Hope Street, Providence 6, Rhode Island.
One volume of six numbers is planned for 1963. The subscription price is \$11.00.
Vols. 1-13 (1950-1962) are available at the price of \$14.00 each. Volume 1 was pub-

lished in 1950.

### Transactions of the American Mathematical Society

This journal is devoted entirely to research in pure and applied mathematics, and

includes in general, longer memoirs than the PROCEEDINGS.

Four volumes of three numbers each will be published in 1963. The price per volume is \$8.00. All inquiries for volumes 1-69 should be directed to Johnson Reprint Corporation, 111 Fifth Avenue, New York 3, New York. Orders for volumes 70-106 should be directed to the American Mathematical Society; the price for back issues insofar as they are available is \$4.00 per issue (vols. 78-89 contain 2 issues, volumes 70-77 and 90-108 contain 3 issues).

The Proceedings of the American Mathematical Society is published bimonthly, in February, April, June, August, October, and December. Price per annual volume is \$11.00. Subscriptions, orders for back numbers, and inquiries in regard to nondelivery of current numbers should be addressed to the American Mathematical Society, 190 Hope Street, Providence 6, R. I.

Second-class postage paid at Providence, Rhode Island and additional mailing offices, Authorization is granted under the authority of the act of August 24, 1912, as amended by the act of August 4, 1947 (sec. 34.21, P. L. & R.). Acceptance for mailing at the special rate of postage provided for in section 34.40, paragraph d., P. L. & R.

Copyright ©, American Mathematical Society, 1963

# Journals Published by the

# American Mathematical Society

#### **Mathematical Reviews**

This journal is devoted to abstracts and reviews of the current mathematical literature of the world. Two volumes will be published in 1963, Volume 25 and Volume 26. Each volume will consist of 6 regular issues plus an index issue. In each regular issue the abstracts and reviews are grouped under subject headings. Publication began in 1940.

Subscription price per volume of 7 issues is \$50.00; 2 volumes per year \$100.00. Back issues: volumes 1-16 (1940-1955) \$42.00 per volume; volumes 17-24 (1956-1962) \$50.00 per volume.

### Soviet Mathematics—Doklady

This journal contains the entire pure mathematics section of the Doklady Akademii Nauk SSSR in translation. It appears six times a year, each bimonthly issue corresponding to one volume of the Soviet Doklady. (The Doklady Akademii Nauk SSSR is issued three times a month, six issues constituting a volume.)

Current subscriptions are as follows: Domestic, \$17.50; foreign, \$20.00. Single issues are \$5.00. Volumes 1, 2, 3, and 4 (1960–1963) are available at \$30.00 per volume

or \$5.00 per issue.

#### Chinese Mathematics—Acta

This is a cover to cover translation into English of Acta Mathematica Sinica, published by Academia Sinica Peking, People's Republic of China. Acta Mathematica Sinica contains current research in all fields of pure mathematics. Two volumes, Vols. 2 and 3, are planned for 1963. Vol. 1 (1962) \$30.00. Subscription price per volume is \$20.00.

### Notices of the American Mathematical Society

This journal announces the programs of the meetings of the Society. It carries the abstracts of all contributed papers presented at the meetings of the Society and pub-

lishes news items of interest to mathematical scientists.

The subscription price is \$7.00 per annual volume of seven numbers. A single copy is \$2.00. Orders for back volumes (back issues of the last two years only are available)

are \$14.00 per volume.

All communications should be addressed to the Editor, 190 Hope Street, Providence 6, Rhode Island. News items and insertions for each issue must be in the hands of the editor on or before the deadline for the abstracts for the papers to be presented in the meetings announced in that issue. These deadlines are published regularly on the back of the title page.

#### Mathematics of Computation

A journal devoted to original papers in numerical analysis, the application of numerical methods and high-speed calculator devices, the computation of mathematical tables, the theory of high-speed calculating devices and other aids to computation.

In addition it publishes reviews and notes in these and related fields. Published by the Society for the National Academy of Sciences-National Research Council.

Subscription price is \$8.00 per volume of 4 issues. Single copies are \$2.50. Back issues insofar as they are available are as follows: 1943–1947, \$1.00 per issue; 1948–1949, \$1.25 per issue; 1959–1958, \$1.50 per issue (or \$5.00 per volume); 1959–1961,

\$2.50 per issue (or \$8.00 per volume).

# CONTENTS

Vol. 14, No. 5	OCTOBER,	1963	Whole No.	. 83
				Page
On a related function theore	m. By E. B. LEACH			687
A variation on the Stone-We Weak convergence of stochas				.690
By Charles Stone				694
Σ-symmetric locally convex				697
On finitely additive set func				701
A note on the representation				705
Convergence, density, and $\tau$ -				708
Divergence of approximating	polynomials. By P	. C. CURTIS. II	R	713
A note on ergodic transforma				718
On the maximal ergodic theo				722
On subgroup commutators.				724
Remarks on balanced incomp	plete block designs.	By E. T. PAR	KER	729
A supplement to Parker's "By ESTHER SEIDEN	Remarks on balance	ed incomplete	block designs."	731
Products of indecomposable,	aperiodic stochast	ic matrices By	v I WOLFOWITZ	733
Remark on a characterization group. By Chr. U. Jensen	n of certain ring clas	s fields by their	r absolute Galois	738
On minimal sets of generator	rs of purely insepara	able field exter	nsions.	
By P. T. Rygg	- ofto-in ideals	D D E M.	D.=	742
On the homological dimensional Concerning a theorem of L. I				751
				754
The Euler $\phi$ function for gen				763
On commutators in a simple Algebras split by a given pur				768
Rings in which the unique				100
By R. W. GILMER				777
On groups with enough finite				782
Certain problems of different				787
New proof of the generalized				790
A note on unary algebras. B	y JOHN MARICA			792
Some uses of the second con	nformal structure of	n strictly conv	rex surfaces.	793
By TILLA KLOTZ A note on the homology of d	lalated product apac	oc By C W 1	DATTON	800
Imbedding and immersion of				801
A note on metrization of Mo				804
A note on absolute $G_{\delta}$ -spaces				806
Differential operators with a				809
Two convolution transforms w				812
The circulation of vector field				818
An integral inequality. By I				823
Bounds for the solutions of By ZEEV NEHARI	a class of nonlinear	partial differe	ential equations.	829
Column sequences in Hausdo	orff matrices By I	D BUCKHOLTZ		837
The zeros of infrapolynomial By J. L. Walsh and O.	ls with prescribed va	alues at given	points.	839
-, ,				
	SHORTER NO			
A note on free algebras. By	R. S. PIERCE			845