

PROCEEDINGS
OF THE
AMERICAN MATHEMATICAL SOCIETY

EDITED BY

R. P. BOAS

P. R. HALMOS

IRVING KAPLANSKY

HANS SAMELSON

WITH THE COÖPERATION OF

RAOUL BOTT

PAUL CIVIN

EDWIN HEWITT

R. V. KADISON

ERWIN KLEINFELD

JACOB KOREVAAR

M. O. READE

I. M. SINGER

R. M. THRALL

JOHN WERMER

VOLUME 9, NUMBER 5

OCTOBER, 1958

PUBLISHED BY THE SOCIETY
MENASHA, WIS., AND PROVIDENCE, R. I.

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 details of its meeting. It contains some of the officially invited addresses presented before the Society, research announcements and problems, and reviews of advanced mathematical books.

One volume of six numbers is planned for 1958. 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), \$20.00 each; vols. 36-55 (1930-1949), \$28.00 each; vols. 56-63 (1950-1957), \$14.00 each.

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. Volume 1 appeared in 1950.

Articles for insertion in the PROCEEDINGS should be typewritten, double spaced, and the manuscript should not exceed 12 pages. 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.

Papers in algebra and number theory should be sent to IRVING KAPLANSKY, Eckhart Hall, University of Chicago, Chicago 37, Ill.; in probability, real variables, logic and foundations to P. R. HALMOS, Eckhart Hall, University of Chicago, Chicago 37, Ill.; in abstract analysis to either P. R. HALMOS or IRVING KAPLANSKY; in geometry and topology to HANS SAMELSON, Department of Mathematics, University of Michigan, Ann Arbor, Mich.; in other branches of analysis, applied mathematics and all other fields to R. P. BOAS, Lunt Building, Northwestern University, Evanston, Ill. All other communications to the editors should be addressed to the managing editor, IRVING KAPLANSKY.

One volume of six numbers is planned for 1958. The subscription price is \$11.00. Vols. 1-8 (1950-1957) are available at the price of \$14.00 each.

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.

Three volumes of two numbers each will be published in 1958. The price per volume is \$8.00. Volumes 1-36 (1900-1934) consist of four numbers each. Volumes 66-67 (1949) and 78-88 (1955-1958) consist of two numbers each. All other volumes consist of three numbers each. The prices of back volumes, insofar as they are available, are as follows: vols. 1-36 (1900-1934), \$16.00 each; vols. 37-65, 68-77 (1934-1954), \$12.00 each; vols. 66, 67, 78-88 (1949, 1955-1958), \$8.00 each.

Mathematical Reviews

This journal contains abstracts and reviews of the current mathematical literature of the world. It is sponsored by thirteen mathematical organizations, located both in the United States and abroad.

The publication of MATHEMATICAL REVIEWS was begun in 1940. It appears monthly, excepting July, and the price per annual volume is \$35.00. Orders for complete volumes only are accepted. Volumes 10 and 17 are not available. Volumes 1-9, 11-16 and 18 are available at the following prices: Vols. 1-2 (1940-1941), \$24.00 each; all other volumes \$36.00.

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, 450 Ahnapp Street, Menasha, Wis., or 190 Hope Street, Providence 6, R. I.

Entered as second-class matter at the post office at Menasha, Wisconsin. 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 35.40, paragraph d., P. L. & R.

Copyright, American Mathematical Society, 1958

Printed in the United States of America

Books Published by the
American Mathematical Society

Colloquium Publications

- | | | |
|-----|---|--------|
| 37. | N. Jacobson, <i>Structure of rings</i> , 1956, viii, 263 pp. | \$7.70 |
| 36. | W. H. Gottschalk and G. A. Hedlund, <i>Topological dynamics</i> , 1955, viii, 151 pp. | 5.10 |
| 35. | A. C. Schaeffer and D. C. Spencer, <i>Coefficient regions for schlicht functions</i> , 1950, xvi, 311 pp. | 6.00 |
| 34. | J. L. Walsh, <i>The location of critical points of analytic and harmonic functions</i> , 1950, viii, 384 pp. | 6.00 |
| 32. | R. L. Wilder, <i>Topology of manifolds</i> , 1949, x, 402 pp. | 7.00 |
| 31. | Einar Hille and R. S. Phillips, <i>Functional analysis and semi-groups</i> , 1957; enlarged and revised edition of book of the same title published in 1948 by the first of the two authors, xii, 808 pp. | 13.80 |
| 30. | T. Radó, <i>Length and area</i> , 1948, vi, 572 pp. | 6.75 |
| 28. | G. T. Whyburn, <i>Analytic topology</i> , 1942; reprinted, 1955, x, 280 pp. | 4.75 |
| 27. | S. Lefschetz, <i>Algebraic topology</i> , 1942; reprinted, 1955, vi, 389 pp. | 4.40 |
| 24. | A. A. Albert, <i>Structure of algebras</i> , 1939; reprinted, 1952, xii, 210 pp. | 4.00 |
| 20. | J. L. Walsh, <i>Interpolation and approximation by rational functions in the complex domain</i> , 1935; revised edition, 1956, x, 398 pp. | 7.00 |
| 18. | M. Morse, <i>The calculus of variations in the large</i> , 1934; reprinted, 1947, x, 368 pp. | 5.35 |
| 17. | J. H. M. Wedderburn, <i>Lectures on matrices</i> , 1934; reprinted, 1949, x, 205 pp. | 3.35 |
| 15. | M. H. Stone, <i>Linear transformations in Hilbert space and their applications to analysis</i> , 1932; reprinted, 1958, viii, 622 pp. | 8.00 |
| 11. | D. Jackson, <i>The theory of approximation</i> , 1930, reprinted, 1951, viii, 178 pp. | 3.35 |
| 10. | A. B. Coble, <i>Algebraic geometry and theta functions</i> , 1929; reprinted, 1947, viii, 282 pp. | 4.00 |
| 9. | G. D. Birkhoff, <i>Dynamical systems</i> , 1927; reprinted, 1952, viii, 295 pp. | 4.60 |
| 8. | L. P. Eisenhart, <i>Non-Riemannian geometry</i> , 1927; reprinted 1958, xiii + 184 pp. | 4.90 |
| 5. | O. Veblen, <i>Analysis situs</i> , 1922, 2d ed., 1931, reprinted, 1951, x, 194 pp. | 3.35 |
| 3. | E. Kasner, <i>Differential-geometric aspects of dynamics</i> , 1913; reprinted, 1947, iv, 117 pp. | 2.50 |

Mathematical Surveys

- | | | |
|----|---|--------|
| 6. | C. Chevalley, <i>Introduction to the theory of algebraic functions of one variable</i> , 1951, xii, 188 pp. | \$4.00 |
| 5. | S. Bergman, <i>The kernel function and conformal mapping</i> , 1950, viii, 161 pp. | 4.00 |
| 4. | O. F. G. Schilling, <i>The theory of valuations</i> , 1950, viii, 253 pp. | 6.00 |
| 3. | M. Marden, <i>The geometry of the zeros of a polynomial in a complex variable</i> , 1949, x, 181 pp. | 5.00 |
| 1. | J. A. Shohat and J. D. Tamarkin, <i>The problem of moments</i> , 1943; reprinted, 1950, xiv, 144 pp. | 3.35 |

Proceedings of Symposia in Applied Mathematics

- | | | |
|----|---|--------|
| 2. | Electromagnetic theory, 1950, iv, 91 pp. | \$3.00 |
| 1. | Non-linear problems in mechanics of continua, 1949, iv, 219 pp. | 5.25 |
-

The price to members of the American Mathematical Society is 25% less than list.
Volumes which are not listed above are out of print.

CONTENTS

Vol. 9, No. 5

OCTOBER, 1958

Whole No. 53

	Page
The equivalence of two extensions of Lebesgue area. By EDWARD SILVERMAN..	671
A report on primes of the form $k \cdot 2^n + 1$ and on factors of Fermat numbers. By R. M. ROBINSON.....	673
Ordered commutative semigroups of the second kind. By A. H. CLIFFORD....	682
On a closure property of measurable sets. By E. J. MICKLE.....	688
The class of recursive functions. By J. R. SHOENFIELD.....	690
On a Tauberian theorem of Landau. By BASIL GORDON.....	693
On nilstable algebras. By L. A. KOKORIS.....	697
Automorphisms of products of measure spaces. By DOROTHY MAHARAM....	702
On the structure of maximum modulus algebras. By WALTER RUDIN.....	708
On a class of universal ordered sets. By ELLIOTT MENDELSON.....	712
The structure of a special class of rings. By W. S. MARTINDALE, III.....	714
On the lattice of all join-endomorphisms of a lattice. By G. GRÄTZER and E. T. SCHMIDT.....	722
Linear completeness and hyperbolic trigonometry. By C. M. FULTON.....	726
Limit sections and universal points of convex surfaces. By Z. A. MELZAK....	729
Another subdivision which can not be shelled. By CHANDLER DAVIS.....	735
On the Hankel J-, Y- and H-transforms. By J. L. GRIFFITH.....	738
On the extrema of certain polynomials. By ROBERT BREUSCH.....	742
On means of entire functions (II). By Q. I. RAHMAN.....	748
On a class of univalent, star shaped mappings. By ALBERT SCHILD.....	751
On the determination of a function in the plane by its integrals over straight lines. By J. W. GREEN.....	758
Asymptotic properties of subharmonic and analytic functions. By J. I. ITÔ....	763
On the iteration of transformations in noncompact minimal dynamical systems. By F. E. BROWDER.....	773
On spaces which are not of countable character. By J. M. MARR.....	780
Lacunary Fourier series on noncommutative groups. By SIGURÐUR HELGASON.	782
Multiplications on the line. By J. G. HORNE, JR.....	791
A note on complete collectionwise normality and paracompactness. By L. F. MCAULEY.....	796
On a class of fixed-point-free graphs. By GERT SABIDUSSI.....	800
A partition theorem for Euclidean n -space. By HANS SAMELSON, R. M. THRALL and OSCAR WESLER.....	805
The cohomology algebra of certain loop spaces. By EDWARD HALPERN.....	808
Totally nonconnected im kleinen continua. By E. E. GRACE.....	818
A fixed point theorem for nilpotent Lie groups. By LOUIS AUSLANDER.....	822
An iterative solution of the quadratic equation in Banach space. By J. E. McFARLAND.....	824