

PROCEEDINGS  
OF THE  
AMERICAN MATHEMATICAL SOCIETY

EDITED BY

R. P. BOAS

P. R. HALMOS

ALEX ROSENBERG

HANS SAMELSON

WITH THE COÖPERATION OF

RICHARD BELLMAN

FELIX BROWDER

E. E. FLOYD

I. N. HERSTEIN

ERWIN KLEINFELD

J. C. MOORE

M. O. READE

DANA SCOTT

A. H. TAUB

DANIEL ZELINSKY

VOLUME 11, NUMBER 6

DECEMBER, 1960

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 meetings. 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 1960. 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. 56-64 (1950-1959), \$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 ALEX ROSENBERG, Department of Mathematics, University of California, Berkeley 4, California; in probability, real variables, logic, and foundations to P. R. HALMOS, Eckhart Hall, University of Chicago, Chicago 37, Illinois; in abstract analysis to either P. R. HALMOS or ALEX ROSENBERG; in geometry and topology to HANS SAMELSON, Institute for Advanced Study, Princeton, N. J.; in other branches of analysis, applied mathematics, and all other fields to R. P. BOAS, Lunt Building, Northwestern University, Evanston, Illinois. All other communications to the editors should be addressed to the Managing Editor, P. R. HALMOS.

One volume of six numbers is planned for 1960. The subscription price is \$11.00. Vols. 1-10 (1950-1959) 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.

Four volumes of three numbers each will be published in 1960. 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, 78-93 (1949, 1955-1959), \$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 \$50.00. Orders for complete volumes only are accepted. Volumes 10 and 17 are not available. Volumes 1-9, 11-16, 18, and 19 are available at the following prices: Vols. 1-14 (1940-1953), \$24.00 each; all other volumes \$50.00.

---

---

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, Curtis Reed Plaza, Menasha, Wis., or 190 Hope Street, Providence 6, R. I.

Second-class postage paid 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 34.40, paragraph d., P. L. & R.

Copyright ©, American Mathematical Society, 1961

Printed in the United States of America

## INDEX OF VOLUME 11

- Aeppli, Alfred. *On the uniqueness of compact solutions for certain elliptic differential equations*, 826
- Altman, M. *Functional equations involving a parameter*, 54.
- Amitsur, S. A. *Finite dimensional central division algebras*, 28.
- Artzy, R. *Relations between loop identities*, 847.
- Auslander, Joseph. *On the proximal relation in topological dynamics*, 890.
- Auslander, Louis. *Discrete solvable matrix groups*, 687.
- Avann, S. P. *Upper and lower complementation in a modular lattice*, 17.
- Baxter, W. E. *Concerning strong Lie ideals*, 393.
- Bear, H. S. *Some boundary properties of function algebras*, 1.
- Beck, Anatole. *A note on semi-groups in a locally compact group*, 992.
- Bing, R. H. and Curtis, M. L. *Imbedding decompositions of  $E^3$  in  $E^4$* , 149.
- Blair, R. L. and Eggan, L. C. *On the compactness of the structure space of a ring*, 876.
- Blair, R. L. and Tomber, M. L. *The axiom of choice for finite sets*, 222.
- Block, Richard. *On Lie algebras of classical type*, 377.
- Brace, J. W. *Almost uniform convergence versus pointwise convergence*, 986.
- Bradford, J. C. and Goffman, Casper. *Metric spaces in which Blumberg's theorem holds*, 667.
- Brauer, Alfred. *A note on a number theoretical paper of Sierpinski*, 406.
- Brown, Morton. *Some Applications of an approximation theorem for inverse limits*, 478.
- Brown, R. K. *Univalence of Bessel functions*, 278.
- Brown, T. A. and Comfort, W. W. *New method for expansion and contraction maps in uniform spaces*, 483.
- Buck, R. C. *Zero sets for continuous functions*, 630.
- Carlitz, L. *A characterization of algebraic number fields with class number two*, 391.
- *Note on Nörlund's polynomial  $B_n^{(2)}$* , 452.
- *A theorem on permutations in a finite field*, 456.
- *A note on Gauss' first proof of the quadratic reciprocity theorem*, 563.
- *A determinant connected with Fermat's last theorem*, 730.
- Chacon, R. V. *The influence of the dissipative part of a general Markov process*, 957.
- Chow, Y. S. *A martingale inequality and the law of large numbers*, 107.
- Civin, Paul. *Isometries of group algebras*, 983.
- Cohen, Eckford. *Arithmetical functions of a greatest common divisor. I*, 164.
- Cohen, Haskell. *A clan with zero without the fixed point property*, 937.
- Comfort, W. W. *The isolated points in the dual of a commutative semi-group*, 227.
- See Brown, T. A.
- Cordes, H. O. *A matrix inequality*, 206.
- Cross, G. E. *The relation between two definite integrals*, 578.
- Curtis, Charles W. *On projective representations of certain finite groups*, 852.
- Curtis, H. B., Jr. *The uniformization of a class of simply connected Riemann surfaces*, 511.
- Curtis, M. L. See Bing, R. H.
- Curtis, M. L. and Zeeman, E. C. *On the polyhedral Schoenflies theorem*, 888.
- Dawson, D. F. *Concerning convergence of continued fractions*, 640.
- Debreu, Gerard. *On "an identity in arithmetic,"* 220.
- Doyle, P. H. and Hocking, J. G. *Some results on tame disks and spheres in  $E^3$* , 832.
- Drăgăilă, Pavel. *Sur un système de couples de réseaux parallèles*, 255.

- Edrei, Albert and Shah, S. M. *A conjecture of R. Nevanlinna concerning the genus of a meromorphic function*, 319.
- Eggan, L. C. See Blair, R. L.
- Ellis, Robert. *Universal minimal sets*, 540.
- Epstein, Bernard and Minker, Jack. *Extremal interpolatory problems in the unit disc*, 777.
- Ewing, G. M. *Lipschitzian parameterizations and existence of minima in the calculus of variations*, 87.
- Faith, C. C. *Algebraic division ring extensions*, 43.  
 ——— *Correction to "Galois extensions,"* 670.
- Federer, Herbert. *The area of a nonparametric surface*, 436.
- Feit, Walter. *A theorem on factorizable groups*, 658.
- Fort, M. K., Jr. *Neighborhood extensions of continuous selections*, 682.
- Foulis, D. J. *Baer \*-semigroups*, 648.
- Gentile, E. R. *On rings with one-sided field of quotients*, 380.
- Gillman, Leonard. *Countably generated ideals in rings of continuous functions*, 660.
- Glicksberg, Irving. *Some special transformation groups*, 315.
- Goffman, Casper. *A remark concerning the area of a nonparametric surface*, 463.
- Goffman, Casper and Neugebauer, C. J. *On approximate derivatives*, 962.
- Goffman, Casper and Waterman, Daniel. *Basic sequences in the space of measurable functions*, 211.
- Goffman, Casper. See Bradford, J. C.
- Goldberg, K. *Generating functions for formal power series in noncommuting variables*, 988.
- Gorenstein, Daniel and Herstein, I. N. *On the structure of certain factorizable groups*. II, 214.
- Gould, Gerald. See Mahowald, Mark.
- Gould, H. W. *The Lagrange interpolation formula and Stirling numbers*, 421.  
 ——— *Stirling number representation problems*, 447.
- Graves, L. M. *The Weierstrass condition for multiple integral variational problems involving higher derivatives*, 750.
- Groemer, Helmut. *The number of lattice points on the boundary of a star body*, 757.
- Grünbaum, Branko. *A variant of Helly's theorem*, 517.
- Hahn, F. J. *Recursion of set trajectories in a transformation group*, 527.
- Halfar, Edwin. *Conditions implying continuity of functions*, 688.
- Halpern, Edward. *On the primitivity of Hopf algebras over a field with prime characteristic*, 117.  
 ——— *A note on divided powers in a Hopf algebra*, 547.
- Hancock, V. R. *On complete semimodules*, 71.
- Harary, Frank and Norman, R. Z. *Dissimilarity characteristic theorems for graphs*, 332.
- Hartman, Philip. *A lemma in the theory of structural stability of differential equations*, 610.
- Heerema, Nikolas. *Derivations and embeddings of a field in its power series ring*, 188.
- Heller, Alex. *A simple proof of the Künneth theorem*, 676.
- Heller, Robert, Jr. *Some convergence theorems for continued fractions*, 805.
- Hermann, Robert. *A sufficient condition that a mapping of Riemannian manifolds be a fibre bundle*, 236.  
 ——— *Variational completeness for compact symmetric spaces*, 544.
- Herstein, I. N. See Gorenstein, Daniel.

- Herzog, Fritz and Kelly, L. M. *A generalization of the theorem of Sylvester*, 327.
- Hicks, N. *An example concerning affine connexions*, 952.
- Hilton, P. J. and Spanier, E. H. *On the imbeddability of certain complexes in euclidean spaces*, 523.
- Hobby, Charles and Wright, C. R. B. *A generalization of a theorem of N. Itô on  $p$ -groups*, 707.
- Hochschild, G. *On the algebraic hull of a Lie algebra*, 195.  
 ——— *The universal representation kernel of a Lie group*, 625.
- Hocking, J. G. See Doyle, P. H.
- Holland, Charles. *A totally ordered integral domain with a convex left ideal which is not an ideal*, 703.
- Hostinsky, L. A. *Splitting criteria for modular lattices*, 23.
- Hsiang, F. C. *On the absolute summability of a Fourier series and its conjugate series*, 32.  
 ——— *On the Gibbs phenomenon for harmonic means*, 284.
- Hsiang, Wu-yi. *On the distributive law*, 348.
- Hsü, Chin-shui. *A remark on the characterization of homothetic transformation and inversion*, 685.  
 ——— *Generalization of Cohn-Vossen's theorem*, 845.
- Hummel, J. A. *Extremal problems in the class of starlike functions*, 741.
- Hunter, L. C. *On induced topologies in quasi-reflexive Banach spaces*, 161.
- Isbell, J. R. *Homogeneous games*. II, 159.
- Jans, J. P. *Verification of a conjecture of Gerstenhaber*, 335.
- Johnson, R. E. *Structure theory of faithful rings, III. Irreducible rings*, 710.
- Joichi, J. T. *On closed operators with closed range*, 80.
- Jones, F. B. *Another cutpoint theorem for plane continua*, 556.
- Kalman, J. A. *Triangle inequality in  $l$ -groups*, 395.
- Kelly, L. M. See Herzog, Fritz.
- Kinney, J. R. *Note on a singular function of Minkowski*, 788.
- Koch, R. J. and Krule, I. S. *Weak cutpoint ordering on hereditarily unicoherent continua*, 679.
- Koh, S. S. *Note on the homotopy properties of the components of the mapping space  $X^{S^p}$* , 896.
- Kolchin, Ellis and Lang, Serge. *Existence of invariant bases*, 140.
- Kolettis, George, Jr. *Semi-complete primary abelian groups*, 200.
- Krule, I. S. See Koch, R. J.
- Kwun, K. W. and Raymond, Frank. *Generalized cells in generalized manifolds*, 135.
- Lang, Serge. See Kolchin, Ellis.
- Langenhop, C. E. *Bounds on the norm of a solution of a general differential equation*, 795.
- Leach, E. B. *Regular sequences and frequency distributions*, 566.
- Leadley, J. D. and Ritchie, R. W. *Conditions for the power associativity of algebras*, 399.
- deLeeuw, Karel, Rudin, Walter and Wermer, John. *The isometries of some function spaces*, 694.
- Li, Ta. *A new class of integral transforms*, 290.
- Liu, Shih-Chao. *A theorem on general recursive functions*, 184.  
 ——— *Proof of a conjecture of Roulledge*, 967.
- Mahowald, Mark and Gould, Gerald. *Quasi-barrelled locally convex spaces*, 811.
- Mandan, S. R. *Cevian simplexes*, 837.
- Mardešić, Sibe. *On the Hahn-Mazurkiewicz theorem in nonmetric spaces*, 929.
- Martin, N. F. G. *A note on metric density of sets of real numbers*, 344.

- Matlis, Eben. *Divisible modules*, 385.
- Matsushima, Yatarō. *Hausdorff interval topology on a partially ordered set*, 233.
- Melzak, Z. A. *The isoperimetric problem of the convex hull of a closed space curve*, 265.
- *A countable interpolation problem*, 304.
- *A note on sets of constant width*, 493.
- Menon, P. K. *Difference sets in abelian groups*, 368.
- Meyer-König, W. and Zeller, K. *On Borel's method of summability*, 307.
- Mihalek, R. J. *Modularity relations in lattices*, 9.
- Minker, Jack. See Epstein, Bernard.
- Mitchell, Josephine. *Remarks on Cauchy's integral formula in matrix spaces*, 299.
- Moser, D. E. *The Taylor and other methods of summability*, 90.
- Motzkin, T. S. *Determinants whose elements have equal norm*, 871.
- *Power series with gaps*, 875.
- Muhly, H. T. *Complete ideals in local rings*, 361.
- Naito, T. *On a problem of Wolk in interval topologies*, 156.
- Narasimhan, Raghavan. *Holomorphic mappings of complex spaces*, 800.
- Neugebauer, C. J. See Goffman, Casper.
- Newman, Donald J.  $1 - 1 + 1 - 1 + \dots = \frac{1}{2}$ , 440.
- *Insertion of  $\pm$  signs in  $e^x$* , 444.
- *Another proof of the minimax theorem*, 692.
- *One-one polynomial maps*, 867.
- Newman, Morris. *Irrational power series*, 699.
- Norman, Edward. *A discrete analogue of the Weierstrass transform*, 596.
- Norman, R. Z. See Harary, Frank.
- Oikawa, Kōtaro. *Sario's lemma on harmonic functions*, 425.
- *On the uniqueness of the prolongation of an open Riemann surface of finite genus*, 785.
- Olubummo, A. *On the existence of an absolutely minimal norm in a Banach algebra*, 718.
- O'Neill, Barrett. *Immersion of manifolds of nonpositive curvature*, 132.
- Onuchic, Nelson. *On the Nachbin uniform structure*, 177.
- Ore, Oystein. *Sex in graphs*, 533.
- Palais, R. S. *Extending diffeomorphisms*, 274.
- Petersen, G. M. *Almost convergence and the Buck-Pollard property*, 469.
- *Summability of a class of Fourier series*, 994.
- Phelps, R. R. *A representation theorem for bounded convex sets*, 976.
- Pinl, M. *On affinely connected manifolds whose torsion can be transformed into constant components*, 505.
- Plunkett, R. L. *Openness of the derivative of a complex function*, 671.
- Portmann, W. O. *Hausdorff-analytic functions of matrices*, 97.
- *A sufficient condition for a matrix function to be a primary matrix function*, 102.
- Posner, E. C. *Prime rings satisfying a polynomial identity*, 180.
- *Differentiably simple rings*, 337.
- Putnam, Hilary and Smullyan, R. M. *Exact separation of recursively enumerable sets within theories*, 574.
- Rahman, Q. I. *On entire functions defined by a Dirichlet series: correction*, 624.
- Raymond, Frank. See Kwun, K. W.
- Reich, Edgar. *A counter example of Koebe's for slit mappings*, 970.
- Reiner, Irving. *The nonuniqueness of irreducible constituents of integral group representations*, 655.

- Ritchie, R. W. See Leadley, J. D.
- Roberts, J. B. *Polynomial identities*, 723.
- Robinson, E. A. *Sums of stationary random variables*, 77.
- Rooney, P. G. *On the representation of sequences as Fourier coefficients*, 762.
- Rosen, Ronald H. *Decomposing 3-space into circles and points*, 918.
- Rotman, J. J. *A note on completions of modules*, 356.
- Rudin, Walter. See deLeeuw, Karel.
- Sanderson, D. E. *Isotopy in 3-manifolds. III. Connectivity of spaces of homeomorphisms*, 171.
- Schenkman, Eugene and Scott, W. R. *A generalization of the Cartan-Brauer-Hua theorem*, 396.
- Scott, W. R. See Schenkman, Eugene.
- Seifert, George. *Almost periodic solutions for systems of differential equations near points of nonlinear first approximation*, 429.
- Shah, S. M. See Edrei, Albert.
- Shoenfield, J. R. *An uncountable set of incomparable degrees*, 61.
- Sion, Maurice. *Topological and measure theoretic properties of analytic sets*, 769.
- Smullyan, R. M. See Putnam, Hilary, 574.
- Spanier, E. H. See Hilton, P. J.
- Stewart, T. E. *On groups of diffeomorphisms*, 559.
- Stong, R. E. *Some global properties of hypersurfaces*, 126.  
——— *Some characterizations of Riemann  $n$ -spheres*, 945.
- Strang, W. G. *On the Kantorovich inequality*, 468.
- Sunyer i Balaguer, F. *On entire functions defined by a Dirichlet series*, 621.
- Supnick, Fred. *A theorem concerning six points*, 498.
- Swan, R. G. *The nontriviality of the restriction map in the cohomology of groups*, 885.
- Swartz, B. K. and Wendroff, B. *Continued function expansions of real numbers*, 634.
- Swingle, P. M. *The existence of widely connected and biconnected semigroups*, 243.  
——— *Widely connected and biconnected semigroups*, 249.
- Taam, C. T. *Compact linear transformations*, 39.
- Thomas, Emery. *A note on certain polynomial algebras*, 410.
- Thorp, Edward. *Best possible triangle inequalities for statistical metric spaces*, 734.
- Tobin, Seán. *Simple bounds for Burnside  $p$ -groups*, 704.
- Tomber, M. L. See Blair, R. L.
- Tomić, M. *A note on lacunary Fourier series*, 460.
- Tutte, W. T. *An algorithm for determining whether a given binary matroid is graphic*, 905.
- Urbanik, Kazimierz and Wright, F. B. *Absolute-valued algebras*, 861.
- Valentine, F. A. *Characterizations of convex sets by local support properties*, 112.
- Varshney, O. P. *On the absolute harmonic summability of Fourier series*, 588.
- Ward, L. E., Jr. *On local trees*, 940.
- Waterman, Daniel. See Goffman, Casper.
- Watts, C. E. *Intrinsic characterizations of some additive functors*, 5.
- Welland, R. R. *Metrisable Köthe spaces*, 580.
- Wells, J. H. *Hausdorff transforms of bounded sequences*, 84.
- Wendroff, B. See Swartz, B. K., 634.
- Wermer, John. See deLeeuw, Karel.
- Werner, Helmut. *The existence of surfaces of constant mean curvature with arbitrary Jordan curves as assigned boundary*, 63.

- Wesler, Oscar. *An infinite packing theorem for spheres*, 324.
- Wilcox, C. H. *Addition theorems for arbitrary plane and spherical waves*, 817.
- Wolk, E. S. *On partially ordered sets possessing a unique order-compatible topology*, 487.
- Wright, C. R. B. See Hobby, Charles.
- Wright, F. B. *The converse of the individual ergodic theorem*, 415.
- *Invariant measure, the recurrence theorem, and the ergodic theorem*, 605.
- See Urbanik, Kazimierz.
- Young, G. S. *Fixed-point theorems for arcwise connected continua*, 880.
- Zeeman, E. C. See Curtis, M. L.
- Zeller, K. See Meyer-König, W.



## Journals Published by the American Mathematical Society

---

---

### 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.)

Rates per annual volume are as follows: Domestic subscriptions, \$17.50; foreign subscriptions, \$20.00. Single issues are \$5.00.

### 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 publishes news items of interest to mathematical scientists.

The subscription price is \$7.00 per annual volume of 7 numbers. A single copy is \$2.00.

All communications should be addressed to the Editor, G. L. WALKER, 190 Hope Street, Providence 6, R. I. News items and insertions for each issue must be in the hands of the editor on or before the deadline for the abstracts of the papers to be presented in the meetings announced in that issue. These deadlines are published regularly on the inside front cover page.

### Memoirs of the American Mathematical Society

This is a series of paperbound research tracts which are of the same general character as papers published in the TRANSACTIONS. An issue contains either a single monograph or a group of cognate papers. Published at irregular intervals. The latest numbers in this series are:

- |  |      |
|--|------|
| 25. A. Erdélyi and C. A. Swanson, <i>Asymptotic forms of Whittaker's confluent hypergeometric function</i> . 49 pp. 1957.        | 1.40 |
| 26. Walter Strodt, <i>Principal solutions of ordinary differential equations in the complex domain</i> . 107 pp. 1957.           | 2.00 |
| 27. Emery Thomas, <i>The generalized Pontrjagin cohomology operations and rings with divided powers</i> . 82 pp. 1957.           | 1.70 |
| 28. Ernst Snapper, <i>Cohomology groups and genera of higher-dimensional fields</i> . 100 pp. 1957.                              | 1.90 |
| 29. Edward Halpern, <i>Twisted polynomial hyperalgebras</i> . 61 pp. 1958.   | 1.50 |
| 30. L. Auslander and L. Markus, <i>Flat Lorentz 3-manifolds</i> . 60 pp. 1959.   | 2.00 |
| 31. W. S. Loud, <i>Periodic solutions of <math>x'' + cx' + g(x) = \epsilon f(t)</math></i> . 58 pp. 1959.                        | 2.00 |
| 32. R. S. Pierce, <i>Translation lattices</i> . 66 pp. 1959.   | 1.70 |
| 33. Ernst Snapper, <i>Cohomology theory and algebraic correspondences</i> . 96 pp. 1959.   | 1.90 |
| 34. E. M. Zaustinsky, <i>Spaces with non-symmetric distance</i> . 91 pp. 1959.   | 2.00 |
| 35. Richard Bellman and K. L. Cooke, <i>Asymptotic behavior of solutions of differential-difference equations</i> . 91 pp. 1959. | 2.00 |
| 36. Richard S. Palais, <i>The classification of G-spaces</i> . 72 pp. 1960.  | 1.65 |
- 
-

## CONTENTS

Vol. 11, No. 6

DECEMBER, 1960

Whole No. 66

	Page
Relations between loop identities. By R. ARTZY . . . . .	847
On projective representations of certain finite groups. By C. W. CURTIS . . . . .	852
Absolute-valued algebras. By KAZIMIERZ URBANIK and F. B. WRIGHT . . . . .	861
One-one polynomial maps. By D. J. NEWMAN . . . . .	867
Determinants whose elements have equal norm. By T. S. MOTZKIN . . . . .	871
Power series with gaps. By T. S. MOTZKIN . . . . .	875
On the compactness of the structure space of a ring. By R. L. BLAIR and L. C. EGGAN . . . . .	876
Fixed-point theorems for arcwise connected continua. By G. S. YOUNG . . . . .	880
The nontriviality of the restriction map in the cohomology of groups. By R. G. SWAN . . . . .	885
On the polyhedral Schoenflies theorem. By M. L. CURTIS and E. C. ZEEMAN . . . . .	888
On the proximal relation in topological dynamics. By JOSEPH AUS- LANDER . . . . .	890
Note on the homotopy properties of the components of the mapping space $X^{SP}$ . By S. S. KOH . . . . .	896
An algorithm for determining whether a given binary matroid is graphic. By W. T. TUTTE . . . . .	905
Decomposing 3-space into circles and points. By R. H. ROSEN . . . . .	918
On the Hahn-Mazurkiewicz theorem in nonmetric spaces. By SIBE MARDEŠIĆ . . . . .	929
A clan with zero without the fixed point property. By HASKELL COHEN . . . . .	937
On local trees. By L. E. WARD, JR. . . . .	940
Some characterizations of Riemann $n$ -spheres. By R. E. STONG . . . . .	945
An example concerning affine connexions. By N. HICKS . . . . .	952
The influence of the dissipative part of a general Markov process. By R. V. CHACON . . . . .	957
On approximate derivatives. By CASPER GOFFMAN and C. J. NEUGE- BAUER . . . . .	962
Proof of a conjecture of Routledge. By S.-C. LIU . . . . .	967
A counterexample of Koebe's for slit mappings. By EDGAR REICH . . . . .	970
A representation theorem for bounded convex sets. By R. R. PHELPS . . . . .	976
Isometries of group algebras. By PAUL CIVIN . . . . .	983
Almost uniform convergence versus pointwise convergence. By J. W. BRACE . . . . .	986
Generating functions for formal power series in noncommuting vari- ables. By K. GOLDBERG . . . . .	988
A note on semi-groups in a locally compact group. By ANATOLE BECK . . . . .	992
Summability of a class of Fourier series. By G. M. PETERSEN . . . . .	994
Errata . . . . .	999
Index . . . . .	1001