

**Pacific  
Journal of  
Mathematics**

VOLUME XII

1962

# PACIFIC JOURNAL OF MATHEMATICS

## EDITORS

RALPH S. PHILLIPS

Stanford University  
Stanford, California

M. G. ARSOVE

University of Washington  
Seattle 5, Washington

A. L. WHITEMAN

University of Southern California  
Los Angeles 7, California

LOWELL J. PAIGE

University of California  
Los Angeles 24, California

## ASSOCIATE EDITORS

E. F. BECKENBACH

T. M. CHERRY

D. DERRY

M. OHTSUKA

H. L. ROYDEN

E. SPANIER

E. G. STRAUS

F. WOLF

## SUPPORTING INSTITUTIONS

UNIVERSITY OF BRITISH COLUMBIA  
CALIFORNIA INSTITUTE OF TECHNOLOGY  
UNIVERSITY OF CALIFORNIA  
MONTANA STATE UNIVERSITY  
UNIVERSITY OF NEVADA  
NEW MEXICO STATE UNIVERSITY  
OREGON STATE UNIVERSITY  
UNIVERSITY OF OREGON  
OSAKA UNIVERSITY  
UNIVERSITY OF SOUTHERN CALIFORNIA

STANFORD UNIVERSITY  
UNIVERSITY OF TOKYO  
UNIVERSITY OF UTAH  
WASHINGTON STATE UNIVERSITY  
UNIVERSITY OF WASHINGTON  
\* \* \*  
AMERICAN MATHEMATICAL SOCIETY  
CALIFORNIA RESEARCH CORPORATION  
SPACE TECHNOLOGY LABORATORIES  
NAVAL ORDNANCE TEST STATION

## CONTENTS

|   |      |
|---|------|
| Alfred Aeppli, <i>Some exact sequences in cohomology theory for Kähler manifolds</i> . . . . .  | 791  |
| J. L. Alperin, <i>Groups with finitely many automorphisms</i> . . . . .   | 1    |
| T. Andô, <i>On fundamental properties of a Banach space with a cone</i> . . . . .   | 1163 |
| Martin Arkowitz, <i>The generalized Whitehead product</i> . . . . .   | 7    |
| John D. Baum, <i>Instability and asymptoticity in topological dynamics</i> . . . . .  | 25   |
| W. G. Bade and R. S. Freeman, <i>Closed extensions of the Laplace operator determined by a general class of boundary conditions</i> . . . . . | 395  |
| Paul R. Beesack, <i>On the Green's function of an <math>N</math>-point boundary value problem</i> . . . . .                                   | 801  |
| Sterling K. Berberian, <i>A note on hyponormal operators</i> . . . . .  | 1171 |
| William A. Beyer, <i>Hausdorff dimension of level sets of some Rademacher series</i> . . . . .  | 35   |
| Errett Bishop, <i>Analytic functions with values in a Frechet space</i> . . . . .   | 1177 |
| J. R. Boen, <i>On <math>p</math>-automorphic <math>p</math>-groups</i> . . . . .  | 813  |
| J. R. Boen, O. Rothaus and J. Thompson, <i>Further results on <math>p</math>-automorphic <math>p</math>-groups</i> . . . . .                  | 817  |
| S. E. Bohn, <i>Equicontinuity of solutions of a quasi-linear equation</i> . . . . .   | 1193 |
| J. H. Bramble and L. E. Payne, <i>Bounds in the Neumann problem for second order uniformly elliptic operators</i> . . . . .                   | 823  |
| William Browder and Edwin Spanier, <i><math>H</math>-spaces and quality</i> . . . . .   | 411  |
| F. H. Brownell, <i>A note on Cook's wave-matrix theorem</i> . . . . .   | 47   |
| A. M. Bruckner and E. Ostrow, <i>Some function classes related to the class of convex functions</i> . . . . .                                 | 1203 |
| Stewart S. Cairns, <i>On permutations induced by linear value functions</i> . . . . .   | 415  |
| S. Cater, <i>On Hilbert space operators and operator roots of polynomials</i> . . . . .   | 429  |
| G. D. Chakerian, <i>An inequality for closed space curves</i> . . . . .   | 53   |
| C. C. Chang and H. Jerome Keisler, <i>Applications of ultraproducts of pairs of cardinals to the theory of models</i> . . . . .               | 835  |
| Stephen U. Chase, <i>Torsion-free modules over <math>K[x, y]</math></i> . . . . .   | 437  |
| Stephen U. Chase, <i>On direct sums and product of modules</i> . . . . .  | 847  |
| Inge Futtrup Christensen, <i>Some further extensions of a theorem of Marcinkiewicz</i> . . . . .  | 59   |
| Paul Civin, <i>Annihilators in the second conjugate algebra of a group algebra</i> . . . . .  | 855  |
| Charles V. Coffman, <i>Linear differential equations on cones in Banach spaces</i> . . . . .  | 69   |

|  |      |
|--|------|
| Eckford Cohen, <i>Arithmetical notes. III. Certain equally distributed sets of integers</i> . . . . .  | 77   |
| H. S. Collins, <i>Remarks on affine semigroups</i> . . . . .   | 449  |
| Peter Crawley, <i>Direct decompositions with finite dimensional factors</i>  | 457  |
| J. H. Curtiss, <i>Polynomial interpolation in points equidistributed on the unit circle</i> . . . . .  | 863  |
| J. H. Curtiss, <i>Limits and bounds for derived differences on a Jordan curve in the complex domain</i> . . . . .  | 1217 |
| R. B. Darst, <i>A continuity property for vector valued measurable functions</i> . . . . .   | 469  |
| John Derr and Angus E. Taylor, <i>Operators of meromorphic type with multiple poles of the resolvent</i> . . . . .                                       | 85   |
| R. P. Dilworth, <i>Abstract commutative ideal theory</i> . . . . .   | 481  |
| P. H. Doyle and J. C. Hocking, <i>Continuously invertible spaces</i> . .   | 499  |
| P. H. Doyle and J. G. Hocking, <i>Dimensional invertibility</i> . . . .  | 1235 |
| David G. Feingold and Richard S. Varga, <i>Block diagonally dominant matrices and generalizations of the Gerschgorin circle theorem</i> . . . . .        | 1241 |
| Jacob Feldman, <i>On measurability of stochastic processes in products space</i> . . . . .   | 113  |
| S. R. Foguel, <i>Markov processes with stationary measure</i> . . . .  | 505  |
| M. K. Fort, Jr., <i>Homogeneity of infinite products of manifolds with boundary</i> . . . . .  | 879  |
| Leonard Fountain and Lloyd Jackson, <i>A generalized solution of the boundary value problem for <math>y'' = f(x, y, y')</math></i> . . . . .             | 1251 |
| A. S. Fraenkel, See B. Gordon, A. S. Fraenkel and E. G. Straus.  |      |
| Robert S. Freeman, <i>Closed extensions of the Laplace operator determined by a general class of boundary conditions for unbounded regions</i> . . . . . | 121  |
| R. S. Freeman, See W. G. Bade and R. S. Freeman.   |      |
| R. E. Fullerton, <i>Geometric structure of absolute basis systems in a linear topological space</i> . . . . .  | 137  |
| Dieter Gaier, <i>On conformal mapping of nearly circular regions</i> .   | 149  |
| Robert W. Gilmer, <i>Rings in which semi-primary ideals are primary</i> . . . . .  | 1273 |
| Andrew M. Gleason and Hassler Whitney, <i>The extension of linear functionals defined on <math>H^\infty</math></i> . . . . .                             | 163  |
| Andrew M. Gleason, <i>The abstract theorem of Cauchy-Weil</i> . . . .  | 511  |
| James Glimm, <i>Families of induced representations</i> . . . . .  | 885  |
| Seymour Goldberg, <i>Closed linear operators and associated continuous linear operators</i> . . . . .  | 183  |
| Ruth Goodman, <i>K-polar polynomials</i> . . . . .   | 1277 |
| B. Gordon, A. S. Fraenkel and E. G. Straus, <i>On the determination of sets by the sets of sums of a certain order</i> . . . . .                         | 187  |

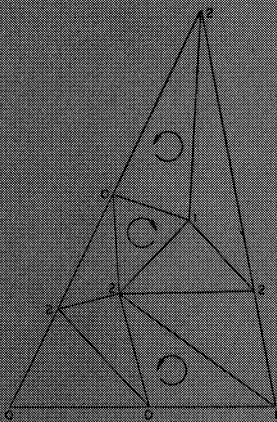
|   |      |
|---|------|
| Daniel Gorenstein, Reuben Sandler and W. H. Mills, <i>On almost-commuting permutations</i> . . . . .                                | 913  |
| Allan B. Gray, Jr., <i>Normal subgroups of monomial groups</i> . . .  | 527  |
| Branko Grünbaum, <i>The dimension of intersections of convex sets</i> .   | 197  |
| Israel Halperin and Maria Wonenburger, <i>On the additivity of lattice completeness</i> . . . . .                                   | 1289 |
| V. C. Harris and M. V. Subba Rao, <i>Congruence properties of <math>\sigma r(N)</math></i>  | 925  |
| Robert W. Heath, <i>Arc-wise connection in semi-metric spaces</i> . . .   | 1301 |
| I. Heller and A. J. Hoffman, <i>On unimodular matrices</i> . . . . .  | 1321 |
| Melvin Henriksen and J. R. Isbell, <i>Lattice-ordered rings and function rings</i> . . . . .  | 533  |
| Robert G. Heyneman, <i>Duality in general ergodic theory</i> . . . . .  | 1329 |
| Paul Hill, <i>On the number of pure subgroups</i> . . . . .   | 203  |
| Charles Hobby, <i>Abelian subgroups of <math>p</math>-groups</i> . . . . .  | 1343 |
| Harry Hochstadt, <i>Fourier series with linearly dependent coefficients</i>   | 929  |
| J. G. Hocking, See P. H. Doyle and J. G. Hocking.   |      |
| Kenneth Hoffman and John Wermer, <i>A characterization of <math>C(X)</math></i> .   | 941  |
| Kenneth Hoffman and Hugo Rossi, <i>The minimum boundary for an analytic polyhedron</i> . . . . .                                    | 1347 |
| A. J. Hoffman, See I. Heller and A. J. Hoffman.   |      |
| Robert P. Holten, <i>Generalized Goursat problem</i> . . . . .  | 207  |
| Alfred Horn, <i>Eigenvalues of sums of Hermitian matrices</i> . . . . .   | 225  |
| H. C. Howard, <i>Oscillation and nonoscillation criteria for <math>y''(x) + f(y(x))p(x) = 0</math></i> . . . . .                    | 243  |
| Robert W. Hunt, <i>The behavior of solutions of ordinary, self-adjoint differential equations of arbitrary even order</i> . . . . . | 945  |
| Taqdir Husain, <i><math>S</math>-spaces and the open mapping theorem</i> . . . . .  | 253  |
| Richard Isaac, <i>Markov processes and unique stationary probability measures</i> . . . . .   | 273  |
| J. R. Isbell, See Melvin Henriksen and J. R. Isbell.  |      |
| J. R. Isbell, <i>Supercomplete spaces</i> . . . . .   | 287  |
| J. R. Isbell, <i>On a finite-dimensional uniform spaces, II</i> . . . . .   | 291  |
| Lloyd Jackson, See Leonard Fountain and Lloyd Jackson.  |      |
| N. Jacobson, <i>A note on automorphism of Lie algebra</i> . . . . .   | 303  |
| Amnon Jakimovski, <i>Tauberian constants for the <math>[J, f(x)]</math> transformations</i> . . . . .                               | 567  |
| Adam Korányi, <i>The Bergman kernel function for tubes over convex cones</i> . . . . .  | 1355 |
| H. Jerome Keisler, See C. C. Chang and H. Jerome Keisler.   |      |
| Hubert C. Kennedy, <i>Group membership in semigroups</i> . . . . .  | 577  |
| Eleanor Killam, <i>The spectrum and the radical in locally <math>m</math>-convex algebras</i> . . . . .                             | 581  |
| Edward T. Kobayashi, <i>A remark on the Nijenhuis tensor</i> . . . . .  | 963  |
| A. Kosinski, <i>A theorem on families a cyclic sets and its application</i>   | 317  |

|  |      |
|--|------|
| A. H. Kruse, <i>Completion of mathematical systems</i> . . . . .   | 589  |
| Magnus Lindberg, <i>On two Tauberian remainder theorems</i> . . . . .  | 607  |
| Lionello A. Lombardi, <i>A general solution of Tonelli's problem of the calculus of variations</i> . . . . .                       | 617  |
| David London, <i>On the zeros of the solutions of <math>w''(z) + p(z)w(z) = D</math></i>   | 979  |
| G. R. MacLane and F. B. Ryan, <i>On the radical limits of Blaschke products</i> . . . . .  | 993  |
| T. M. MacRobert, <i>Evaluation of an E-function when three of its upper parameters differ by integral values</i> . . . . .         | 999  |
| Marvin Marcus and Henryk Minc, <i>The invariance of symmetric function of singular values</i> . . . . .                            | 327  |
| Marvin Marcus and Morris Newman, <i>The sum of the powers of a matrix</i> . . . . .  | 627  |
| P. Masani and J. Robertson, <i>The time-domain analysis of a continuous parameter weakly stationary stochastic process</i> . .     | 1361 |
| Michael Maschler, <i>Derivatives of the harmonic measures in multiply-connected domains</i> . . . . .                              | 637  |
| W. S. Massey, <i>Non-existence of almost-complex structures on quaternionic projective spaces</i> . . . . .                        | 1379 |
| Robert McKelvey, <i>The spectra of minimal self-adjoint extensions of a symmetric operator</i> . . . . .                           | 1003 |
| R. D. McWilliams, <i>A note on weak sequential convergence</i> . . . . .   | 333  |
| W. H. Mills, See Daniel Gorenstein, Ruben Sandler and W. H. Mills.   |      |
| J. Milnor, <i>On axiomatic homology theory</i> . . . . .   | 337  |
| Henryk Minc, See Marvin Marcus and Henryk Minc.  |      |
| V. J. Mizel and M. M. Rao, <i>Nonsymmetric projections in Hilbert space</i> . . . . .  | 343  |
| Deane Montgomery and Hans Samelson, <i>On the action of <math>SO(3)</math> on <math>S^n</math></i>                                 | 649  |
| D. Montgomery and C. T. Tang, <i>A theorem on the action of <math>SO(3)</math></i>   | 1385 |
| Calvin C. Moore, <i>On the Frobenius reciprocity theorem for locally compact groups</i> . . . . .                                  | 359  |
| J. Barros-Neto, <i>Analytic composition kernels on Lie groups</i> . . . . .  | 661  |
| D. J. Newman, <i>The Gibbs phenomenon for Hausdorff means</i> . . . . .  | 367  |
| Morris Newman, See Marvin Marcus and Morris Newman.  |      |
| R. J. Nunke, <i>A note on Abelian group extensions</i> . . . . .   | 1401 |
| A. Olubummo, <i>Operators of finite rank in a reflexive Banach space</i>   | 1023 |
| E. Ostrow, See A. M. Bruckner and E. Ostrow.   |      |
| Carl Pearcy, <i>A complete set unitary invariants for operators generating finite <math>W^*</math>-algebra of Type I</i> . . . . . | 1405 |
| Mario Petrich, <i>Semicharacters of the Cartesian products of two semigroups</i> . . . . .   | 679  |
| David A. Pope, <i>On the approximation of function spaces in the calculus of variations</i> . . . . .                              | 1029 |

- Edward C. Posner, *Integral closure of rings of solutions of linear differential equations* . . . . . 1417
- J. S. Pym, *Idempotent measures on semigroups* . . . . . 685
- M. M. Rao, See V. J. Mizel and M. M. Rao.
- M. V. Subba Rao, See V. C. Harris and M. V. Subba Rao.
- J. Robertson, See P. Masani and J. Robertson.
- K. Rogers and E. G. Straus, *A special class of matrices* . . . . . 699
- Bernard W. Roos and Ward C. Sangren, *Three spectral theorems for a pair of singular first-order differential equations* . . . . . 1047
- Hugo Rossi, See Kenneth Hoffman and Hugo Rossi.
- F. B. Ryan, See G. R. MacLane and F. B. Ryan.
- Arthur A. Sagle, *Simple Malcev algebras over fields of characteristic zero* . . . . . 1057
- Hans Samelson, See Deane Montgomery and Hans Samelson.
- Reuben Sandler, See Daniel Gorenstein, Reuben Sandler and W. H. Mills.
- Ward C. Sangren, See Bernard W. Roos and Ward C. Sangren.
- Leo Sario, *Meromorphic functions and conformal metrics on Riemann surfaces* . . . . . 1079
- D. Sather, *Asymptotics III: Stationary phase for two parameters with an application to Bessel functions* . . . . . 1423
- Jack Segal, *Convergence of inverse systems* . . . . . 371
- U. Shukla, *On the projective cover of a module and related results* 709
- Josef Siciak, *On function families with boundary* . . . . . 375
- J. Ślaskowska, *Bounds of analytic functions of two complex variables in domains with the Bergman-Shilov boundary* . . . . . 1435
- Edwin Spanier, See William Browder and Edwin Spanier.
- Joseph G. Stampfli, *Hyponormal operators* . . . . . 1453
- E. G. Straus, See B. Gordon, A. S. Fraenkel and E. G. Straus.
- E. G. Straus, See K. Rogers and E. G. Straus.
- Richard G. Swan, *Factorization of polynomials over finite fields* . 1099
- S. C. Tang, *Some theorems on the ratio of empirical distribution to the theoretical distribution* . . . . . 1107
- Angus E. Taylor, See, John Derr and Angus E. Taylor.
- R. C. Thompson, *Normal matrices and the normal basis in Abelian number fields* . . . . . 1115
- J. Thompson, See J. H. Bramble and J. Thompson.
- D. H. Tucker, *An existence theorem for a Goursat problem* . . . . . 719
- Howard G. Tucker, *Absolute continuity of infinitely divisible distributions* . . . . . 1125
- Richard S. Varga, See David G. Feingold and Richard S. Varga.
- Georges G. Weill, *Reproducing kernels and orthogonal kernels for analytic differentials on Riemann surfaces* . . . . . 729
- Georges G. Weill, *Capacity differentials on open Riemann surfaces* 769

|  |      |
|--|------|
| Georges G. Weil, <i>Some extremal properties of linear combinations of kernels on Riemann surfaces</i> . . . . . | 1459 |
| Elliot Carl Weinberg, <i>Completely distributive lattice-ordered groups</i>                                      | 1131 |
| James Wells, <i>A note on the primes in a Banach algebra of measures</i>   | 1139 |
| John Wermer, See Kenneth Hoffman and John Wermer.  |      |
| G. K. White, <i>Iterations of generalized Euler functions</i> . . . . .  | 777  |
| Hassler Whitney, See Andrew M. Gleason and Hassler Whitney.  |      |
| H. C. Wiser, <i>Decomposition and homogeneity of continua 2-manifold</i> . . . . .                               | 1145 |
| Maria Wonenburger, See Israel Halperin and Maria Wonenburger.  |      |
| C. T. Yang, See D. Montgomery and C. T. Yang.  |      |
| Adil Yaqub, <i>On certain finite rings and ring-logics</i> . . . . .   | 785  |
| Hyman J. Zimmerberg, <i>Two-point boundary conditions linear on a parameter</i> . . . . .                        | 385  |

# Pacific Journal of Mathematics



|  |     |
|--|-----|
| J. L. Alperin, <i>Groups with finitely many automorphisms</i> .....  | 1   |
| Martin Arkowitz, <i>The generalized Whitehead product</i> .....  | 7   |
| John D. Baum, <i>Instability and asymptoticity in topological dynamics</i> .....   | 25  |
| William A. Beyer, <i>Hausdorff dimension of level sets of some Rademacher series</i> .....   | 35  |
| F. H. Brownell, <i>A note on Cook's wave-matrix theorem</i> .....  | 47  |
| G. D. Chakerian, <i>An inequality for closed space curves</i> .....  | 53  |
| Inge Futtrup Christensen, <i>Some further extensions of a theorem of Marcinkiewicz</i> .....   | 59  |
| Charles V. Coffman, <i>Linear differential equations on cones in Banach spaces</i> .....   | 69  |
| Eckford Cohen, <i>Arithmetical notes, III. Certain equally distributed sets of integers</i> .....  | 77  |
| John Derr and Angus E. Taylor, <i>Operators of meromorphic type with multiple poles of the resolvent</i> .....                                       | 85  |
| Jacob Feldman, <i>On measurability of stochastic processes in products space</i> .....   | 113 |
| Robert S. Freeman, <i>Closed extensions of the Laplace operator determined by a general class of boundary conditions for unbounded regions</i> ..... | 121 |
| R. E. Fullerton, <i>Geometric structure of absolute basis systems in a linear topological space</i> .....  | 137 |
| Dieter Gaier, <i>On conformal mapping of nearly circular regions</i> .....   | 149 |
| Andrew M. Gleason and Hassler Whitney, <i>The extension of linear functionals defined on <math>H^\infty</math></i> .....                             | 163 |
| Seymour Goldberg, <i>Closed linear operators and associated continuous linear operators</i> .....  | 183 |
| B. Gordon, A. S. Fraenkel and E. C. Straus, <i>On the determination of sets by the sets of sums of a certain order</i> .....                         | 187 |
| Branko Grünbaum, <i>The dimension of intersections of convex sets</i> .....  | 197 |
| Paul Hill, <i>On the number of pure subgroups</i> .....  | 203 |
| Robert P. Holten, <i>Generalized Goursat problem</i> .....   | 207 |
| Alfred Horn, <i>Eigenvalues of sums of Hermitian matrices</i> .....  | 225 |
| H. C. Howard, <i>Oscillation and nonoscillation criteria for <math>y''(x) + f(y(x))p(x) = 0</math></i> .....   | 243 |
| Taqdir Husain, <i>S-spaces and the open mapping theorem</i> .....  | 253 |
| Richard Isaac, <i>Markov processes and unique stationary probability measures</i> .....  | 273 |
| J. R. Isbell, <i>Supercomplete spaces</i> .....  | 287 |
| J. R. Isbell, <i>On a finite-dimensional uniform spaces, II</i> .....  | 291 |
| N. Jacobson, <i>A note on automorphism of Lie algebra</i> .....  | 303 |
| A. Kosinski, <i>A theorem on families of acyclic sets and its application</i> .....  | 317 |
| Marvin Marcus and Henryk Minc, <i>The invariance of symmetric function of singular values</i> .....  | 327 |
| R. D. McWilliams, <i>A note on weak sequential convergence</i> .....   | 333 |
| J. Milnor, <i>On axiomatic homology theory</i> .....   | 337 |
| V. J. Mizel and M. M. Rao, <i>Nonsymmetric projections in Hilbert space</i> .....  | 343 |
| Calvin C. Moore, <i>On the Frobenius reciprocity theorem for locally compact groups</i> .....  | 359 |
| D. J. Newman, <i>The Gibbs phenomenon for Hausdorff means</i> .....  | 367 |
| Jack Segal, <i>Convergence of inverse systems</i> .....  | 371 |
| Jozef Siciak, <i>On function families with boundary</i> .....  | 375 |
| Hyman J. Zimmerberg, <i>Two-point boundary conditions linear in a parameter</i> .....  | 385 |

# PACIFIC JOURNAL OF MATHEMATICS

## EDITORS

RALPH S. PHILLIPS

Stanford University  
Stanford, California

M. G. ARSOVE

University of Washington  
Seattle 5, Washington

A. L. WHITEMAN

University of Southern California  
Los Angeles 7, California

\* E. F. BECKENBACH

University of California  
Los Angeles 24, California

## ASSOCIATE EDITORS

E. F. BECKENBACH

T. M. CHERRY

D. DERRY

M. OHTSUKA

H. L. ROYDEN

E. SPANIER

E. G. STRAUS

F. WOLF

## SUPPORTING INSTITUTIONS

UNIVERSITY OF BRITISH COLUMBIA  
CALIFORNIA INSTITUTE OF TECHNOLOGY  
UNIVERSITY OF CALIFORNIA  
MONTANA STATE UNIVERSITY  
UNIVERSITY OF NEVADA  
NEW MEXICO STATE UNIVERSITY  
OREGON STATE UNIVERSITY  
UNIVERSITY OF OREGON  
OSAKA UNIVERSITY  
UNIVERSITY OF SOUTHERN CALIFORNIA

STANFORD UNIVERSITY  
UNIVERSITY OF TOKYO  
UNIVERSITY OF UTAH  
WASHINGTON STATE UNIVERSITY  
UNIVERSITY OF WASHINGTON  
\* \* \*  
AMERICAN MATHEMATICAL SOCIETY  
CALIFORNIA RESEARCH CORPORATION  
SPACE TECHNOLOGY LABORATORIES  
NAVAL ORDNANCE TEST STATION

---

Mathematical papers intended for publication in the *Pacific Journal of Mathematics* should be typewritten (double spaced), and the author should keep a complete copy. Manuscripts may be sent to any one of the four editors. All other communications to the editors should be addressed to the managing editor, L. J. Paige at the University of California, Los Angeles 24, California.

50 reprints per author of each article are furnished free of charge; additional copies may be obtained at cost in multiples of 50.

---

The *Pacific Journal of Mathematics* is published quarterly, in March, June, September, and December. The price per volume (4 numbers) is \$12.00; single issues, \$3.50. Back numbers are available. Special price to individual faculty members of supporting institutions and to individual members of the American Mathematical Society: \$4.00 per volume; single issues, \$1.25.

Subscriptions, orders for back numbers, and changes of address should be sent to Pacific Journal of Mathematics, 103 Highland Boulevard, Berkeley 8, California.

Printed at Kokusai Bunken Insatsusha (International Academic Printing Co., Ltd.), No. 6, 2-chome, Fujimi-cho, Chiyoda-ku, Tokyo, Japan.

\* During the absence of L. J. Paige

PUBLISHED BY PACIFIC JOURNAL OF MATHEMATICS, A NON-PROFIT CORPORATION

The Supporting Institutions listed above contribute to the cost of publication of this Journal, but they are not owners or publishers and have no responsibility for its content or policies.