## Pacific

## Journal of

 MathematicsVOLUME XC<br>1980

## PACIFIC JOURNAL OF MATHEMATICS

## EDITORS

| Donald Babbitt (Managing Editor) | J. DUGUNDJI |
| :--- | :--- |
| University of Galifornia | Department of Mathematics |
| Los Angeles, California 90024 | University of Southern California |
| HUGO RoSSI | Los Angeles, California 90007 |
| University of Utah | R. FINN AND J. MILGRAM |
| Salt Lake City, UT 84112 | Stanford University |
| C. C. Moore and AndREw OGG | Stanford, California 94305 |
| University of California |  |
| Berkeley, CA 94720 |  |

## ASSOCIATE EDITORS

E. F. Beckenbach
B. H. Neumann
F. Wolf
K. Yoshida

## SUPPORTING INSTITUTIONS

UNIVERSITY OF BRITISH COLUMBIA
CALIFORNIA INSTITUTE OF TECHNOLOGY UNIVERSITY OF CALIFORNIA MONTANA STATE UNIVERSITY UNIVERSITY OF NEVADA, RENO NEW MEXICO STATE UNIVERSITY OREGON STATE UNIVERSITY UNIVERSITY OF OREGON

UNIVERSITY OF SOUTHERN CALIFONIA
STANFORD UNIVERSITY UNIVERSITY OF HAWAII UNIVERSITY OF TOKYO U'NIVERSITY OF UTAH WASHINGTON STATE UNIVERSITY UNIVERSITY OF WASHINGTON

## CONTENTS

## A - ALGEBRA AND NUMBER THEORY

S. D. Cohen, The Galois group of a polynomial with two indeterminate coefficients63
V. K. Deshpande, Completions of Noetherian hereditary prime rings ..... 285
A. G. Earnest, Congruence conditions on integers represented by ternary quadratic forms ..... 325
S. Madhavan, On bisimple weakly inverse semigroups ..... 397
R. A. Mollin, Induced p-elements in the Schur group ..... 169
J. Simon, Wirtinger approximations and the knot groups of $F^{n}$ in $S^{n+2}$ ..... 177
R. L. Snider, The zero divisor conjecture for some solvable groups ..... 191
R. Tuler, Arithmetic sums that determine linear characters on $\Gamma(N)$ ..... 469
J. D. Vaaler, On linear forms and diophantine approximation ..... 475
G. P. Wene, Alternative rings whose symmetric elements are nilpotent or a right multiple is a symmetric idempotent ..... 483
B - ANALYSIS
F. Beatrous, Jr., Hölder estimates for the $\bar{\partial}$ equation with a support condition ..... 249
L. Brown and T. Ito, Classes of Banach spaces with unique isometric preduals ..... 261
R. D. Carmichael and E. K. Hayashi, Analytic functions in tubes which are representable by Fourier-Laplace integrals ..... 51
Z. Ditzian, On interpolation of $L_{p}[a, b]$ and weighted Sobolev spaces ..... 307
M. Faierman, Bounds for the eigenfunctions of a two-parameter system of ordinary differential equations of the second order ..... 335
H. O. Fattorini, Vector valued distributions having a smooth convolution inverse ..... 347
E. K. Hayashi, See R. D. Carmichael and E. K. Hayashi
T. Ito, See L. Brown and T. Ito
R. A. Johnson, Strong liftings commuting with minimal distal flows ..... 77
E. H. Johnston, The boundary modulus of continuity of harmonic functions ..... 87
R. T. Lewis and L. C. Wright, Comparison and oscillation criteria for selfadjoint vector-matrix differential equations . 125
T.-C. Lim, Asymptotic centers and nonexpansive mappings in conjugate Banach spaces ..... 135
F. Mathot, On the decomposition of states of some *-algebras ..... 411
R. C. McCann, Embedding asymptotically stable dynamical systems into radial flows in $l_{2}$ ..... 425
S. M. Rankin, III, Boundary value problems for partial functional differential equations ..... 459
H. M. Srivastava, A note on the Konhauser sets of biorthogonal polynomials suggested by the Laguerre polynomials ..... 197
N. Th. Varopoulos, A probabilistic proof of the Garnett-Jones theorem on BMO ..... 201
L. C. Wright, See R. T. Lewis and L. C. Wright
D — GEOMETRY
E. D. Bolker and B. Roth, When is a bipartite graph a rigid framework? ..... 27
H. D. Fegan, The spectrum of the Laplacian on forms over a Lie group ..... 373
K. M. Kendig, Moiré phenomena in algebraic geometry: Rational alternations in $\boldsymbol{R}^{2}$ ..... 105
B. Roth, See E. D. Bolker and B. Roth
E - LOGIC AND FOUNDATIONS
J. T. Baldwin and D. W. Kueker, Ramsey quantifiers and the finite cover property ..... 11
D. W. Kueker, See J. T. Baldwin and D. W. Kueker
F. Wattenberg, $[0, \infty]$-valued translation invariant measures on $N$ and the Dedekind completion of ${ }^{*} R$ ..... 223
G - TOPOLOGY
S. P. Arya and M. K. Singal, On the locally countable sum theorem ..... 1
C. L. Belna, M. J. Evans and P. D. Humke, Planar continua with restricted limit directions ..... 259
R. Body and R. Douglas, Unique factorization of rational homotopy types ..... 21
A. Browner, Continua in the Stone-Cech remainder of $R^{2}$ ..... 45
R. Douglas, See R. Body and R. Douglas
M. J. Evans, See C. L. Belna, M. J. Evans and P. D. Humke
G. L. Gordon, On the degeneracy of a spectral sequence associatedto normal grossings .389
P. D. Humke, See C. L. Belna, M. J. Evans and P. D. Humke
A. Kawauchi and T. Matumoto, An estimate of infinite
cyclic coverings and knot theory ..... 99
D. J. Lutzer and R. A. McCoy, Category in function spaces, I . 145
T. Matumoto, See A. Kawauchi and T. Matumoto
R. A. McCoy, See D. J. Lutzer and R. A. McCoy
M. L. Mihalik, Ends of fundamental groups in shape and proper homotopy . . . . . . . . . . . . . . . . . . . . 431
M. K. Singal, See S. P. Arya and M. K. Singal

## H - COMBINATORICS

D. Dhar, Asymptotic enumeration of partially ordered sets . . . 299

## Pacific

## Journal of Mathematics

SHASHI PRABHA ARYA and M. K. SINGAL ..... 1
JOHN T. BALDWIN and DAVID W. KUEKER ..... 11
RICHARD BODY and ROY DOUGLAS ..... 21
E. D. BOLKER and B. ROTH ..... 27
ALICIA BROWNER ..... 45
RICHARD D. CARMICHAEL and ELMER K. HAYASHI ..... 51
S. D. COHEN ..... 63
RUSSELL A. JOHNSON ..... 77
ELGIN H. JOHNSTON ..... 87
AKIO KAWAUCHI and TAKAO MATUMOTO ..... 99
KEITH M. KENDIG ..... 105
ROGER T. LEWIS and LYNNE C. WRIGHT ..... 125
TECK-CHEONG LIM ..... 135
D. J. LUTZER and R. A. McCOY ..... 145
RICHARD ANTHONY MOLLIN ..... 169
JONATHAN SIMON ..... 177
ROBERT L. SNIDER ..... 191
H. M. SRIVASTAVA ..... 197
N. Th. VAROPOULOS ..... 201
FRANK WATTENBERG ..... 223

# PACIFIC JOURNAL OF MATHEMATICS 

## EDITORS

Donald Babbitt (Managing Editor)
University of California
Los Angeles, CA 90024
Hugo Rossi
University of Utah
Salt Lake City, UT 84112
C. C. Moore and Andrew OgG

University of California
Berkeley, CA 94720

## J. Dugundji

Department of Mathematics
University of Southern California
Los Angeles, CA 90007
R. Finn and J. Milgram

Stanford University
Stanford, CA 94305

ASSOCIATE EDITORS

E. F. Beckenbach<br>B. H. Neumann<br>F. Wolf<br>K. Yoshida

## SUPPORTING INSTITUTIONS

UNIVERSITY OF BRITISH COLUMBIA<br>CALIFORNIA INSTITUTE OF TECHNOLOGY<br>UNIVERSITY OF CALIFORNIA<br>MONTANA STATE UNIVERSITY<br>UNIVERSITY OF NEVADA, RENO<br>NEW MEXICO STATE UNIVERSITY OREGON STATE UNIVERSITY UNIVERSITY OF OREGON

## UNIVERSITY OF SOUTHERN CALIFORNIA STANFORD UNIVERSITY UNIVERSITY OF HAWAII UNIVERSITY OF TOKYO <br> UNIVERSITY OF UTAH <br> WASHINGTON STATE UNIVERSITY <br> UNIVERSITY OF WASHINGTON

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.

Mathematical papers intended for publication in the Pacific Journal of Mathematics should be in typed form or offset-reproduced, (not dittoed), double spaced with large margins. Please do not use built up fractions in the text of the manuscript. However, you may use them in the displayed equations. Underline Greek letters in red, German in green, and script in blue. The first paragraph or two must be capable of being used separately as a synopsis of the entire paper. Please propose a heading for the odd numbered pages of less than 35 characters. Manuscripts, in triplicate, may be sent to any one of the editors. Please classify according to the scheme of Math. Reviews, Index to Vol. 39. Supply name and address of author to whom proofs should be sent. All other communications should be addressed to the managing editor, or Elaine Barth, University of California, Los Angeles, California, 90024.

50 reprints to each author are provided free for each article, only if page charges have been substantially paid. Additional copies may be obtained at cost in multiples of 50 .

The Pacific Journal of Mathematics is issued monthly as of January 1966. Regular subscription rate: $\$ 84.00$ a year ( 6 Vols., 12 issues). Special rato: $\$ 42.00$ a year to individual members of supporting institutions.

Subscriptions, orders for numbers issued in the last three calendar years, and changes of address shoud be sent to Pacific Journal of Mathematics, P.O. Box 969, Carmel Valley, CA 93924, U.S.A Old back numbers obtainable from Kraus Periodicals Co., Route 100, Millwood, NY 10546.
PUBLISHED BY PACIFIC JOURNAL OF MATHEMATICS, A NON-PROFIT CORPORATION
Printed at Kokusai Bunken Insatsusha (International Academic Printing Co., Ltd.). 8-8, 3-chome, Takadanobaba, Shinjuku-ku, Tokyo 160, Japan.

