## Pacific

Journal of
Mathematics

VOLUME XLV<br>1973

## PACIFIC JOURNAL OF MATHEMATICS

## EDITORS

H. Samelson<br>Stanford University<br>Stanford, California 94305<br>C. R. Hobby<br>University of Washington<br>Seattle, Washington 98105

J. Dugundir

Department of Mathematics
University of Southern California
Los Angeles, California 90007
Richard Arens
University of California
Los Angeles, California 90024

## ASSOCIATE EDITORS

$\begin{array}{llll}\text { E. F. Beckenbach } & \text { B. H. Neumann } & \text { F. Wolf } & \text { Koshida }\end{array}$

## 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 $\stackrel{*}{*} \stackrel{*}{\text { MATHEMATICAL SOCIETY }}$
NAVAL WEAPONS CENTER

## CONTENTS

K. Baclawski and K. M. Kapp, Induced topologies for quasigroups and loops ..... 393
W. G. Bade, Complementation problems for the Baire classes ..... 1
D. G. Bourgin, Fixed point and min-max theorems ..... 403
J. L. Brenner, Zolotarev's theorem on the Legendre symbol ..... 413
I. D. Brown, Representation of finitely generated nilpotent groups ..... 13
H. H. Brungs, Left Euclidean rings ..... 27
V. P. Camillo and J. Cozzens, A theorem on noetherian hereditary rings ..... 35
J. C. Cantrell, Codimension one embeddings of manifolds with locally flat triangulations ..... 43
L. Carlitz, Enumeration of up-down permutations by number of rises ..... 49
T. A. Chapman, Surgery and handle straightening in Hilbert cube manifolds ..... 59
J. A. Childress, Restricting isotopies of spheres ..... 415
R. J. Cook, On the fractional parts of a set of points II ..... 81
J. Coury, Some results on lacunary Walsh series ..... 419
S. H. Cox, Jr., Commutative endomorphism rings ..... 87
J. Cozzens, See V. P. Camillo and J. Cozzens
J. B. Derr and N. P. Mukherjee, Generalized Sylow tower groups,II427
P. F. Duvall, P. Fletcher and R. A. McCoy, Isotopy Galois spaces ..... 435
M. R. Embry, Strictly cyclic operator algebras on a Banach space ..... 443
M. Engber, A Criterion for divisoriality ..... 93
C. Faith, When are proper cyclics injective? ..... 97
A. Fattahi, On generalizations of Sylow tower groups ..... 453
B. Fein and M. Schacher, Maximal subfields of tensor products ..... 479
D. Finkel, Local control and factorization of the focal subgroup ..... 113
P. Fletcher, See P. F. Duvall, P. Fletcher and R. A. McCoy
E. Fried and J. Sichler, Homomorphisms of commutative ringswith unit element485
T. W. Gamelin and J. Garnett, Bounded approximation by rational functions ..... 129
J. Garnett, See T. W. Gamelin and J. Garnett
K. Goebel, On the minimal displacement of points under Lipschitzian mappings ..... 151
K. R. Goodearl, Essential products of nonsingular rings ..... 493
G. Grätzer, B. Jónsson and H. Lakser, The amalgamation property in equational classes of modular lattices ..... 507
F. P. Greenleaf and M. Moskowitz, Cyclic vectors for representations associated with positive definite measures: nonseparable groups165
H. Groemer, On some mean values associated with a randomly selected simplex in a convex set ..... 525
T. G. Hallam and N. Onuchic, Asymptotic relations between perturbed linear systems of ordinary differential equations ..... 187
D. K. Harrison and H. D. Warner, Infinite primes of fields and completions ..... 201
M. Herzog, Central 2-Sylow intersections ..... 535
J. Hillel, On the number of type-k translation-invariant groups ..... 539
J. Hornell, Divisorial complete intersections ..... 217
J. W. Jaworowski, Equivariant extensions of maps ..... 229
J. Jobe, Dendrites, dimension, and the inverse arc function ..... 245
G. W. Johnson and D. L. Skoug, Feynman integrals of non- factorable finite-dimensional functionals ..... 257
B. Jónsson, See G. Grätzer, B. Jónsson and H. LakserK. M. Kapp, See K. Baclawski and K. M. KappD. S. Kim, A boundary for the algebras of bounded holomorphicfunctions269
R. B. Kirk, $A$ note on the Mackey topology for $\left(C^{b}(X)^{*}, C^{b}(X)\right) .5$A. Klein, Renormalized products of the generalized free field andits derivatives275
H. Lakser, See G. Grätzer, B. Jónsson and H. LakserJ. M. Lambert, Simultaneous approximation and interpolationin $L_{1}$ and $C(T)$293
J. W. Lea, Jr., The peripherality of irreducible elements of a lattice ..... 555
J. Locker, Self-adjointness for multi-point differential operators . ..... 561
R. P. Martineau, Splitting of group representations ..... 571
R. A. Massagli, On a new radical in a topological ring ..... 577
R. A. McCoy, See P. F. Duvall, P. Fletcher and R. A. McCoy
K. McKennon, Multipliers of type ( $p, p$ ) and multipliers of thegroup $L_{p}$-algebras297
J. M. McPherson, Wild arcs in three-space 1: families of Fox- Artin arcs ..... 585
J. M. McPherson, Wild arcs in three-space 3: an invariant of oriented local type for exceptional arcs ..... 599
M. Moskowitz, See F. P. Greenleaf and M. MoskowitzN. P. Mukherjee, See J. B. Derr and N. P. Mukherjee
W. Nemitz and T. Whaley, Varieties of implicative semi-latticesII303
N. Onuchic, See T. G. Hallam and N. Onuchic
D. S. Passman, Some isolated subsets of infinite solvable groups. ..... 313
N. Piacun and L. P. Su, Wallman compactifications on $E$ - completely regular spaces ..... 321
J. R. Porter and C. Votaw, $S(\alpha)$ spaces and regular Hausdorff extensions ..... 327
F. Richman, The constructive theory of countable abelian $P$ - groups ..... 621
E. B. Saff and J. L. Walsh, On the convergence of rational functions which interpolate in the roots of unity ..... 639
G. Sampson, Two-sided $L_{p}$ estimates of convolution transforms ..... 347
M. Schacher, See B. Fein and M. Schacher
H. E. Schlais, Non-aposyndesis and non-hereditary decomposability ..... 643
R. E. Showalter, Equations with operators forming a right angle ..... 357
J. Sichler, See E. Fried and J. Sichler
D. L. Skoug, See G. W. Johnson and D. L. SkougR. E. Smithson, Fixed points in partially ordered sets363
V. P. Snaith and J. J. Ucci, Three remarks on symmetric products and symmetric maps ..... 369
L. P. Su, See N. Piacun and L. P. Su
M. L. Teply, A class of divisible modules ..... 653
E. J. Tully, Jr., $\mathscr{C}$-commutative semigroups in which each homomorphism is uniquely determined by its kernel ..... 669
T. R. Turner, Double commutants of weighted shifts ..... 379
J. J. Ucci, See V. P. Snaith and J. J. Ucci
C. Votaw, See J. R. Porter and C. Votaw
J. L. Walsh, See E. B. Saff and J. L. Walsh
G. Warner, Zeta functions on the real general linear group ..... 681
H. D. Warner, See D. K. Harrison and H. D. Warner
T. Whaley, See W. Nemitz and T. Whaley
G. K. Williams, Mappings and decompositions ..... 387
K. Yale, Cocycles with range $\{ \pm 1\}$ ..... 693
C.-L. Yen, On the rest points of a nonlinear nonexpansive semigroup ..... 699

## Pacific

## Journal of Mathematics

W. G. Bade, Complementation problems for the Baire classes ..... 1
I. D. Brown, Representation of finitely generated nilpotent groups ..... 13
H. H. Brungs, Left Euclidean rings. ..... 27
V. P. Camillo and J. Cozzens, A theorem on noetherian hereditary rings ..... 35
J. C. Cantrell, Codimension one embeddings of manifolds with locally flat triangulations ..... 43
L. Carlitz, Enumeration of up-down permutations by number of rises. ..... 49
T. A. Chapman, Surgery and handle straightening in Hilbert cube manifolds ..... 59
R. J. Cook, On the fractional parts of a set of points II. ..... 81
S. H. Cox, Jr., Commutative endomorphism rings ..... 87
M. Engber, A criterion for divisoriality ..... 93
C. Faith, When are proper cyclics injective? ..... 97
D. Finkel, Local control and factorization of the focal subgroup ..... 113
T. W. Gamelin and J. Garnett, Bounded approximation by rational functions . ..... 129
K. Goebel, On the minimal displacement of points under Lipschitzian mappings ..... 151
F. P. Greenleaf and M. Moskowitz, Cyclic vectors for representations associated with positive definite measures: nonseparable groups ..... 165
T. G. Hallam and N. Onuchic, Asymptotic relations between perturbed linear systems of ordinary differential equations. ..... 187
D. K. Harrison and H. D. Warner, Infinite primes of fields and completions ..... 201
J. Hornell, Divisorial complete intersections ..... 217
J. W. Jaworowski, Equivariant extensions of maps. ..... 229
J. Jobe, Dendrites, dimension, and the inverse arc function ..... 245 ..... 245
G. W. Johnson and D. L. Skoug, Feynman integrals of non-factorable finite-dimensional functionals ..... 257
D. S. Kim, $A$ boundary for the algebras of bounded holomorphic functions ..... 269
A. Klein, Renormalized products of the generalized free field and its derivatives ..... 275
J. M. Lambert, Simultaneous approximation and interpolation in $L_{1}$ and $C(T)$ ..... 293
K. McKennon, Multipliers of type ( $p, p$ ) and multipliers of the group $L_{p}$-algebras ..... 297
W. Nemitz and T. Whaley, Varieties of implicative semi-lattices II ..... 303
D. S. Passman, Some isolated subsets of infinite solvable groups ..... 313
N. Piacun and L. P. Su, Wallman compactifications on E-completely regular spaces ..... 321
J. R. Porter and C. Votaw, $S(\alpha)$ spaces and regular Hausdorff extensions. ..... 327
G. Sampson, Two-sided $L_{p}$ estimates of convolution transforms ..... 347
R. E. Showalter, Equations with operators forming a right angle .....  357
R. E. Smithson, Fixed points in partially ordered sets ..... 363
V. P. Snaith and J. J. Ucci, Three remarks on symmetric products and symmetric maps ..... 369
T. R. Turner, Double commutants of weighted shifts ..... 379
G. K. Williams, Mappings and decompositions ..... 387

# PACIFIC JOURNAL OF MATHEMATICS 

## EDITORS

H. Samelson<br>Stanford University<br>Stanford, California 94305<br>C. R. Hobby<br>University of Washington<br>Seattle, Washington 98105

J. Dugundji<br>Department of Mathematics<br>University of Southern California<br>Los Angeles, California 90007

## Richard Arens

University of California
Los Angeles, California 90024

## ASSOCIATE EDITORS

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

## 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<br>UNIVERSITY OF TOKYO<br>UNIVERSITY OF UTAH<br>WASHINGTON STATE UNIVERSITY<br>UNIVERSITY OF WASHINGTON<br> NAVAL WEAPONS CENTER

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. 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. The editorial "we" must not be used in the synopsis, and items of the bibliography should not be cited there unless absolutely necessary, in which case they must be identified by author and Journal, rather than by item number. Manuscripts, in duplicate if possible, may be sent to any one of the four editors. Please classify according to the scheme of Math. Rev. Index to Vol. 39. All other communications to the editors should be addressed to the managing editor, Richard Arens, University of California, Los Angeles, California, 90024.

50 reprints are provided free for each article; 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: $\$ 48.00$ a year ( 6 Vols., 12 issues). Special rate: $\$ 24.00$ a year to individual members of supporting institutions.

Subscriptions, orders for back numbers, and changes of address should be sent to Pacific Journal of Mathematics, 103 Highland Boulevard, Berkeley, California, 94708.

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

Printed at Kokusai Bunken Insatsusha (International Academic Printing Co., Ltd.), 270, 3-chome Totsuka-cho, Shinjuku-ku, Tokyo 160, Japan.

