Pacific Journal of Mathematics

VOLUME XIII 1963

PACIFIC JOURNAL OF MATHEMATICS

EDITORS

RALPH S. PHILLIPS

Stanford University Stanford, California

M. G. Arsove

University of Washington Seattle 5, Washington

J. Dugundji

University of Southern California

Los Angeles 7, California

LOWELL J. PAIGE

University of California Los Angeles 24, California

ASSOCIATE EDITORS

E. F. BECKENBACH

D. DERRY

H. L. ROYDEN

E. G. STRAUS

T. M. CHERRY

M. OHTSUKA

E. SPANIER

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

Printed in Japan by International Academic Printing Co., Ltd., Tokyo Japan

CONTENTS

R. Artzy, Solution of loop equations by adjunction 361
F. W. Ashley, Jr., A cone of super- (L) functions
Dallas O. Banks, Bounds for eigenvalues and generalized con-
vexity
J. W. Bebernes, A subfunction approach to a boundary value
problem for ordinary differential equations 1053
Earl Berkson, Some metrics on the subspaces of a Banach space 7
Earl Berkson, A characterization of scalar type operators on
reflexive Banach spaces
W. W. Bledsoe and A. P. Morse, A topological measure con-
struction
Mario Borelli, Divisorial varieties
R. C. Bose, Strongly regular graphs, partial geometries and
partially balanced designs
Felix E. Browder and Walter A. Strauss, Scattering for non-
, , , , , , , , , , , , , , , , , , , ,
L. Carlitz, The inverse of the error function
Robert Carroll, Some degenerate Cauchy problems with operator
coefficients
E. D. Cashwell and C. J. Everett, Formal power series 45
S. Cater, Continuous linear functionals on certain topological
vector spaces
Afton Cayford, See Marvin Marcus and Afton Cayford.
G. F. Clements, Entropies of several sets of real valued functions 1085
Sandra Barkdull Cleveland, Homomorphisms of non-commutative
*-algebras
W. J. A. Culmer and W. A. Harris, Jr., Convergent solutions of
ordinary linear homogeneous difference equations 1111
Ralph DeMarr, Common fixed points for commuting contraction
mappings
John D. Dixon, General group extensions
J. R. Dorroh, Integral equations in normed abelian groups 1143
M. P. Drazin and E. V. Haynsworth, A theorem of matrices of
0's and 1's
F. G. Dressel, See J. J. Gergen, F. G. Dressel and W. H. Purcell, Jr.
L. C. Eggan and E. A. Maier, On complex approximation 497
C. J. Everett, See E. D. Cashwell and C. J. Everett.
Walter Feit and John G. Thompson, Solvability of groups of odd
order
J. M. G. Fell, Weak containment and Kronecker products of

group representations
Paul Fife, Schauder estimates under incomplete Hölder continuity
assumptions
Shaul R. Foguel, Powers of a contraction in Hilbert space 551
N. E. Foland, The structure of the orbits and their limit sets in
continuous flows
Frank Forelli, Analytic measures 571
Adriano M. Garsia, Entropy and singularity of infinite convolu-
tions
J. J. Gergen, F. G. Dressel and W. H. Purcell, Jr., Convergence
of extended Bernstein polynomials in the complex plane. 1171
•
R. P. Gilbert, On harmonic functions of four variables with
rational p_4 -associates
Robert W. Gilmer, On a classical theorems of Noether in ideal
theory \dots 579
I. Glicksberg, On convex hulls of translates
I. Glicksberg, A remark on analyticity of function algebras 1181
Charles J. A. Halberg, Jr., Semigroups of matrices defining
linked operators with different spectra
P. R. Halmos and J. E. McLaughlin, Partial isometries 585
Philip Harman and Nelson Onuchic, On the asymptotic integration
of ordinary differential equations
W. A. Harris, Jr., See W. J. A. Culmer and W. A. Harris, Jr.
E. V. Haynsworth, See M. P. Drazin and E. V. Haynsworth.
I. Heller, On a class of equivalent systems of linear inequalities 1209
S. Hellerstein, On a class of meromorphic functions with defi-
cient zeros and poles
Joseph Hersch, The method of interior parallels applied to po-
lygonal or multiply connected membranes 1229
A. E. Hurd, Maximum modulus algebras and local approxima-
tion in C^n
M. F. Janowitz, Quantifiers and orthomodular lattices 1241
J. P. Jans, Module classes of finite type 603
Donald W. Kahn, Secondary cohomology operations which extend
the triple product $\dots \dots \dots$
Samuel Karlin and Albert Novikoff, Generalized convex inequal-
ities
Tilla Klotz, Another conformal structure on immersed surfaces
of negative curvature
Gregers Krabbe, Spectral permanence of scalar operators 1289
S. T. Kuroda, Finite-dimensional perturbation and a representa-
tion of scattering operator
Betty Kvarda, On densities of sets of lattice points 611
H. Larcher, A geometric characterization for a class of discon-

tinuous groups of linear fractional transformations 617
G. K. Leaf, A spectral theory for a class of linear operators. 141
R. Sherman Lehman, Algebraic properties of the composition of
solutions of partial differential equations 157
Joseph Lehner, On the generation of discontinuous groups 169
S. P. Lloyd, On certain projections in spaces of continuous func-
tions
Fumi-Yuki Maeda, Generalized spectral operators on locally convex
spaces
E. A. Maier, See L. C. Eggan and E. A. Maier.
Marvin Marcus and Afton Cayford, Equality in certain inequal-
ities
Joseph Martin, A note on uncountably many disks 1331
E. K. McLachlan, Extremal elements of the convex cone of semi-
norms
J. E. McLaughlin, See P. R. Halmos and J. E. McLaughlin.
Donald V. Meyer, E ³ Modulo a 3-cell
W. H. Mills, An applications of linear programming to permu-
$tation\ groups$
J. W. Moon and L. Moser, Simple paths on polyhedra 629
J. W. Moon, An extension of Landau's theorem on tournaments 1343
L. J. Mordell, On the integer solutions of $y(y+1) = x(x+1)(x+2)$ 1347
A. P. Morse, See W. W. Bledsoe and A. P. Morse.
L. Moser, See J. W. Moon and L. Moser.
T. S. Motzkin and E. G. Straus, Representation of a point of a
set as sum of transforms of boundary points 633
K. R. Mount, Some remarks on Fitting's invariants 1353
Albert Novikoff, See Samuel Karlin and Albert Novikoff.
Miroslav Novotný, Über Abbidungen von Mengen
Nelson Onuchic, See Philip Harman and Nelson Onuchic.
R. P. Pakshirajan, An analogue of Kolmogorov's three-series
theorem for abstract random variables 639
R. R. Phelps, Čebyšev subspaces of finite codimension in $C(X)$ 647
R. S. Pierce, Centers of purity in abelian groups 215
Ch. Pommerenke, On meromorphic starlike functions 221
W. H. Purcell, Jr., See J. J. Gergen, F. G. Dressel and W. H.
Purcell, Jr.
J. D. Reid, On subgroups of an abelian group maximal disjoint
from a given subgroup $\ldots \ldots \ldots$
William T. Reid, Riccati matrix differential equations and non-
oscillation criteria for associated linear differential sys-
tems
G. J. Rieger, Some theorems on prime ideals in algebraic number
fields \ldots 687

Gene F. Rose and Joseph S. Ullian, Approximation of functions
of the integers
Zalman Rubinstein, Analytic methods in the study of zeros of
polynomials
Robert Ryan, Conjugate functions in Orlicz spaces 1371
John V. Ryff, On the representation of doubly stochastic operators 1379
B. N. Sahney, On the Nörlund summability of Fourier series . 251
Tôru Saitô, Regular elements in an ordered semigroup 263
F. J. Sansone, Combinatorial functions and regressive isols 703
Leo Sario, On locally meromorphic functions with single-valued
moduli
Donald R. Sherbert, Banach algebras of Lipschitz functions 1387
James M. Sloss, Reflection of biharmonic functions across analytic
boundary conditions with examples
L. M. Sonneborn, Level sets on spheres 297
Walter A. Strauss, See Felix E. Browder and Walter A. Strauss.
E. G. Straus, See T. S. Motzkin and E. G. Straus.
C. A. Swanson, Asymptotic estimates for limit point problems. 305
Takayuki Tamura, Semigroups and their subsemigroup lattices 725
John G. Thompson, See Walter Feit and John G. Thompson.
L. B. Treybig, Concerning homogeneity totally ordered, connected
topological space
Joseph S. Ullian, See Gene F. Rose and S. Ullian.
Lucien Waelbroeck, On the analytic spectrum of Arens 317
H. F. Weinberger, An effectless cutting of a vibrating membrane 1239
John Wermer, The space of real parts of a function algebra 1423
Alvin M. White, Singularities of a harmonic function of three
variables given by its series development 321
Pui-Kei Wong, Existence and asymptotic behavior of proper so-
lutions of a class of second-order nonlinear differential
equations
Koichi Yamamoto, Decomposition fields of difference sets 337
C. T. Yang, On the action of SO(3) on a cohomology manifold. 353
F. M. Yaqub, Free extensions of Boolean algebras 761
J. Yeh, Orthogonal development of functionals and related theo-
rems in the Wiener space of functions of two variables. 1427
William P. Ziemer, On the compactness of integral classes 1437

Pacific Journal of Mathematics

F. W. Ashley, Jr., 21 cone of super (1) functions 1
Earl Berkson, Some metrics on the subspaces of a Banach space 7
Felix E. Browder and Walter A. Strauss, Scattering for non-linear wave
equations 23
E. D. Cashwell and C. J. Everett, Formal power series 45
S. Cater, Continuous linear functionals on certain topological vector spaces 65
John D. Dixon, General group extensions
R. P. Gilbert, On harmonic functions of four variables with rational
p_4 -associates
I. Glicksberg, On convex hulls of translates
S. Hellerstein, On a class of meromorphic functions with deficient zeros and
$poles \dots 115$
Donald W. Kahn, Secondary cohomology operations which extend the triple
product
G. K. Leaf, A spectral theory for a class of linear operators141
R. Sherman Lehman, Algebraic properties of the composition of solutions of
partial differential equations
Joseph Lehner, On the generation of discontinuous groups
S. P. Lloyd, On certain projections in spaces of continuous functions171
Fumi-Yuki Maeda, Generalized spectral operators on locally convex spaces 177
Donald V. Meyer, E ³ modulo a 3-cell
W. H. Mills, An application of linear programming to permutation groups197
R. S. Pierce, Centers of purity in abelian groups215
Ch. Pommerenke, On meromorphic starlike functions
Zalman Rubinstein, Analytic methods in the study of zeros of polynomials237
B. N. Sahney, On the Nörlund summability of Fourier series251
Tôru Saitô, Regular elements in an ordered semigroup
L. M. Sonneborn, Level sets on spheres
C. A. Swanson, Asymptotic estimates for limit point problems305
Lucien Waelbroeck, On the analytic spectrum of Arens,
Alvin M. White, Singularities of a harmonic function of three variables
given by its series development321
Koichi Yamamoto, Decomposition fields of difference sets
C. T. Yang, On the action of SO(3) on a cohomology manifold353

PACIFIC JOURNAL OF MATHEMATICS

EDITORS

RALPH S. PHILLIPS Stanford University Stanford, California

M. G. Arsove University of Washington Seattle 5, Washington J. Dugundji

University of Southern California Los Angeles 7, California

LOWELL J. PAIGE University of California Los Angeles 24, California

ASSOCIATE EDITORS

E. F. BECKENBACH

D. DERRY

H. L. ROYDEN

E. G. STRAUS

T. M. CHERRY

M. OHTSUKA

E. SPANIER

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. Effective with Volume 13 the price per volume (4 numbers) is \$18.00; single issues, \$5.00. Special price for current issues to individual faculty members of supporting institutions and to individual members of the American Mathematical Society: \$8.00 per volume; single issues \$2.50. Back numbers are available.

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.

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.