

TRANSACTIONS
OF THE
AMERICAN MATHEMATICAL SOCIETY

EDITED BY

DUNHAM JACKSON

EDWARD KASNER

HOWARD HAWKS MITCHELL

WITH THE COÖPERATION OF

RAYMOND W. BRINK
OLIVE C. HAZLETT
JOHN R. KLINE
JOSEPH F. RITT
ELLIS B. STOUFFER

EDWARD W. CHITTENDEN
EINAR HILLE
CHARLES N. MOORE
CAROLINE E. SEELY
JACOB D. TAMARKIN

WILLIAM C. GRAUSTEIN
AUBREY J. KEMPNER
GEORGE Y. RAINICH
FRANCIS R. SHARPE
J. H. M. WEDDERBURN

VOLUME 30
1928

PUBLISHED BY THE SOCIETY
MENASHA, WIS., AND NEW YORK

1928

Reprinted with the permission of The American Mathematical Society

JOHNSON REPRINT CORPORATION
111 Fifth Avenue, New York 3, N. Y.

JOHNSON REPRINT COMPANY LIMITED
Berkeley Square House, London, W. 1

First Reprinting, 1963, Johnson Reprint Corporation

TABLE OF CONTENTS

VOLUME 30, 1928

	PAGE
ADAMS, C. R., of Providence, R. I. On the irregular cases of the linear ordinary difference equation	507, 855
ALEXANDER, J. W., of Princeton, N. J. Topological invariants of knots and links.	275
ARCHIBALD, R. G., of New York, N. Y. Diophantine equations in division algebras	819
AYRES, W. L., of Philadelphia, Pa. Concerning the arc-curves and basic sets of a continuous curve.	567
COPELAND, A. H., of Cambridge, Mass. Types of motion of the gyroscope.	737
DAVIS, D. R., of Eugene, Ore. The inverse problem of the calculus of variations in higher space	710
DICKSON, L. E., of Chicago, Ill. Simpler proofs of Waring's theorem on cubes, with various generalizations	1
DINES, L. L., of Saskatoon, Canada. A theorem on orthogonal functions with an application to integral inequalities	425
——— A theorem on orthogonal sequences	439
GEHMAN, H. M., of Austin, Tex. Concerning end points of continuous curves and other continua.	63
GROVE, V. G., of East Lansing, Mich. Transformations of nets	483
HUNTINGTON, E. V., of Cambridge, Mass. The apportionment of representatives in Congress	85
HURWITZ, W. A., of Ithaca, N. Y. On Bell's arithmetic of Boolean algebra	420
JACKSON, D., of Minneapolis, Minn. Some non-linear problems in approximation	621
KASNER, E., of New York, N. Y. Transversality in space of three dimensions	447
——— The second derivative of a polygenic function	803
KETCHUM, P. W., of Urbana, Ill. Analytic functions of hypercomplex variables.	641
LANE, E. P., of Chicago, Ill. The projective differential geometry of systems of linear homogeneous differential equations of the first order	785
LANGER, R. E., of Madison, Wis., and TARTAKIN, J. D., of Providence, R. I. On integral equations with discontinuous kernels	453
LUBBEN, R. G., of Austin, Tex. Concerning limiting sets in abstract spaces	668
MATTHEWS, R. M., of Morgantown, W. Va. Cubic curves and desmic surfaces; second paper.	19
MEARS, F. M., of Ithaca, N. Y. Riesz summability for double series.	686
MILLER, G. A., of Urbana, Ill. Possible orders of two generators of the alternating and of the symmetric group.	24
MILNE, W. E., of Eugene, Ore. The behavior of a boundary value problem as the interval becomes infinite	797

	PAGE
MORSE, M., of Cambridge, Mass. The foundations of a theory in the calculus of variations in the large	213
ORE, O., of New Haven, Conn. Some theorems on the connection between ideals and group of a Galois field.	610
PIERPONT, J., of New Haven, Conn. Optics in hyperbolic space	33
RAWLES, T. H., of New Haven, Conn. The invariant integral and the inverse problem in the calculus of variations	765
RICHARDSON, R. G. D., of Providence, R. I. A problem in the calculus of variations with an infinite number of auxiliary conditions	155
RICHMOND, D. E., of Ithaca, N. Y. Geodesics on surfaces of genus zero with knobs	49
ROOS, C. F., of Houston, Tex. Generalized Lagrange problems in the calculus of variations	360
ROTH, W. E., of Madison, Wis. A solution of the matrix equation $P(X) = A$	579
SLOTNICK, M. M., of Cambridge, Mass. A contribution to the theory of fundamental transformations of surfaces	190
SMITH, H. L., of Baton Rouge, La. On relative content and Green's lemma	405
STURDIVANT, J. H., of Austin, Tex. Second-order linear systems with summable coefficients	560
TAMARKIN, J. D., of Providence, R. I. See LANGER, R. E.	
USPENSKY, J. V., of Leningrad, Russia. On Jacobi's arithmetical theorems concerning the simultaneous representation of numbers by two different quadratic forms.	385
——— On the convergence of quadrature formulas related to an infinite interval	542
WALSH, J. L., of Cambridge, Mass. On the expansion of analytic functions in series of polynomials and in series of other analytic functions. . . .	307
——— On approximation to an arbitrary function of a complex variable by polynomials	472
——— On the degree of approximation to an analytic function by means of rational functions	838
WEISS, M. J., of Stanford University, Calif. Primitive groups which contain substitutions of prime order p and of degree $6p$ or $7p$	333
WHYBURN, G. T., of Austin, Tex. Concerning the cut points of continua	597
WHYBURN, W. M., of Austin, Tex. Second-order differential systems with integral and k -point boundary conditions	630
——— Existence and oscillation theorems for non-linear differential systems of the second order	848
WIDDER, D. V., of Bryn Mawr, Pa. A generalization of Taylor's series .	126
WILLIAMSON, J., of Chicago, Ill. Conditions for associativity of division algebras connected with non-abelian groups	111
ZARYCKI, M., of Lemberg, Poland. Allgemeine Eigenschaften der Cantorschen Kohärenzen	498
Errata, volumes 24, 30	855

TRANSACTIONS OF THE AMERICAN MATHEMATICAL SOCIETY

INDEX, VOLUMES 21-30

1920-1928

	VOL.	PAGES
ADAMS, C. R., The general theory of a class of linear partial q -difference equations.....	26 ₃	283-312
— Existence theorems for a linear partial difference equation of the intermediate type.....	28 ₁	119-128
— On the irregular cases of the linear ordinary difference equation.....	30 ₃ 30 ₄	507-541 855
ALEXANDER, J. W., On the equilibrium of a fluid mass at rest... ..	21 ₄	446-450
— On transformations with invariant points.....	23 ₁	89- 95
— A proof and extension of the Jordan-Brouwer separation theorem.....	23 ₄	333-349
— Invariant points of a surface transformation of given class.....	25 ₂	173-184
— Combinatorial analysis situs.....	28 ₂	301-329
— Topological invariants of knots and links.....	30 ₂	275-306
ARCHIBALD, R. G., Diophantine equations in division algebras..	30 ₄	819-837
AYRES, W. L., Concerning the arc-curves and basic sets of a continuous curve.....	30 ₃	567-578
BATEMAN, H., An extension of Lagrange's expansion.....	28 ₂	346-356
BELL, E. T., Arithmetical paraphrases.....	22 ₁	1- 30
— Arithmetical paraphrases (II).....	22 ₂	198-219
— On restricted systems of higher indeterminate equations..	22 ₄	483-488
— Anharmonic polynomial generalizations of the numbers of Bernoulli and Euler.....	24 ₂	89-112
— Euler algebra.....	25 ₁	135-154
— Applications of analysis to the arithmetic of higher forms..	25 ₂	185-189
— A new type of class number relations.....	26 ₄	446-450
— An algebra of sequences of functions, with an application to the Bernoullian functions.....	28 ₁	129-148
— Arithmetic of logic.....	29 ₃	597-611
BENDER, H. A., Determination of all the prime power groups containing only one invariant subgroup of every index which exceeds this prime number.....	26 ₄	427-434
BERNSTEIN, B. A., Operations with respect to which the elements of a Boolean algebra form a group	26 ₂ 27 ₄	171-175 600
— Sets of postulates for the logic of propositions.....	28 ₃	472-478
— On the existence of fields in Boolean algebras.....	28 ₄	654-657

	VOL.	PAGES
BIRKHOFF, G. D. (with O. D. KELLOGG), Invariant points in function space.....	23 ₁	96-115
BLISS, G. A., Differential equations containing arbitrary functions.....	21 ₂	79- 92
— Functions of lines in ballistics.....	21 ₂	93-106
— Birational transformations simplifying singularities of algebraic curves.....	24 ₄	274-285
— A boundary value problem for a system of ordinary linear differential equations of the first order.....	28 ₄	561-584
BLUMBERG, H., New properties of all real functions.....	24 ₂	113-128
BROWN, B. H., The equilog transformations of euclidean space.	25 ₄	469-484
BROWN, E. P. (with R. E. LANGER), On a class of integral equations with discontinuous kernels.....	29 ₄	683-715
BUCHANAN, D., Asymptotic planetoids.....	23 ₄	409-431
CAMP, C. C., Expansions in terms of solutions of partial differential equations. First paper: Multiple Fourier series expansions.....	25 ₁	123-134
— Expansions in terms of solutions of partial differential equations. Second paper: Multiple Birkhoff series.....	25 ₃	338-342
CARLSON, E., Extension of Bernstein's theorem to Sturm-Liouville sums.....	26 ₂	230-240
— On the convergence of certain methods of closest approximation.....	28 ₃	435-447
CARMAN, M. G., Expansion problems in connection with homogeneous linear q -difference equations.....	28 ₃	523-535
CARPENTER, A. F., Cone cubic configurations of a ruled surface.	27 ₄	397-415
— Triads of ruled surfaces.....	29 ₂	254-275
CASTELLANI, M., Algebraic surfaces with reducible bitangent and osculating hyperplanar sections.....	27 ₃	279-286
CHITTENDEN, E. W., Relatively uniform convergence and the classification of functions.....	23 ₁	1- 15
CHOHKATE, J. See SHOHA, J. A.		
CHURCH, A., On irredundant sets of postulates.....	27 ₃	318-328
— Alternatives to Zermelo's assumption.....	29 ₁	178-208
COBLE, A. B., Associated sets of points.....	24 ₁	1- 20
— Double binary forms with the closure property.....	28 ₃	357-383
COOLIDGE, J. L., The geometry of hermitian forms.....	21 ₁	44- 51
— Differential geometry of the complex plane.....	23 ₂	117-134
— The Gaussian law of error for any number of variables ...	24 ₂	135-143
COPELAND, A. H., Types of motion of the gyroscope.....	30 ₄	737-764
CURTIS, M. F., Curves invariant under point-transformations of special type.....	23 ₂	151-172

	VOL.	PAGES
CURTISS, D. R., A note on the preceding paper (by J. L. WALSH),	24 ₃	181-184
DAVIS, D. R., The inverse problem of the calculus of variations in higher space	30 ₄	710-736
DAVIS, H. T., An existence theorem for the characteristic numbers of a certain boundary value problem	26 ₁	1- 16
DICKSON, L. E., Determination of all general homogeneous polynomials expressible as determinants with linear elements	22 ₂	167-179
— New division algebras	28 ₂	207-234
— Singular case of pairs of bilinear, quadratic, or hermitian forms	29 ₂	239-253
— Simpler proofs of Waring's theorem on cubes, with various generalizations	30 ₁	1- 18
DINES, L. L., A theorem on the factorization of polynomials of a certain type	26 ₁	17- 24
— On sets of functions of a general variable	29 ₂	463-470
— A theorem on orthogonal functions with an application to integral inequalities	30 ₂	425-438
— A theorem on orthogonal sequences	30 ₂	439-446
DODD, E. L., The greatest and least variate under general laws of error	25 ₄	525-539
DOUGLAS, J., On certain two-point properties of general families of curves	22 ₃	289-310
— Normal congruences and quadruply infinite systems of curves in space	26 ₁	68-100
— A criterion for the conformal equivalence of a Riemann space to a euclidean space	27 ₃	299-306
— Extremals and transversality of the general calculus of variations problem of the first order in space	29 ₂	401-420
DRESDEN, A., On the second derivatives of an extremal-integral with an application to a problem with variable end points (supplementary paper)	25 ₂	190-192
EDINGTON, W. E., Abstract group definitions and applications . .	25 ₂	193-210
EIESLAND, J., The group of motions of an Einstein space	27 ₂	213-245
EISENHART, L. P., Orthogonal systems of hypersurfaces in a general Riemann space	25 ₂	259-280
— Symmetric tensors of the second order whose first co- variant derivatives are zero	25 ₂	297-306
— Space-time continua of perfect fluids in general relativity . .	26 ₂	205-220
— Geometries of paths for which the equations of the paths admit a quadratic first integral	26 ₃	378-384
— Fields of parallel vectors in a riemannian geometry	27 ₄	563-573

	VOL.	PAGES
EISENHART, L. P., Geometries of paths for which the equations of the paths admit $n(n+1)/2$ independent linear first integrals	28 ₂	330-338
EMCH, A., On the Weddle surface and analogous loci	27 ₃	270-278
— On the discriminant of ternary forms and a certain class of surfaces	28 ₃	432-434
ETTLINGER, H. J., Oscillation theorems for the real, self-adjoint linear system of the second order	22 ₂	136-143
EVERETT, H. S., Determination of all general homogeneous polynomials expressible as determinants whose elements are homogeneous polynomials	24 ₃	185-194
EVERSULL, B. M., The summability of the triple Fourier series at points of discontinuity of the function developed	26 ₃	313-334
FELDSTEIN, M. M., Invariants of the linear group modulo p^k	25 ₂	223-238
FITE, W. B., Properties of the solutions of certain functional differential equations	22 ₃	311-319
FORD, L. R., On the closeness of approach of complex rational fractions to a complex irrational number	27 ₂	146-154
FORT, T., Note on Dirichlet and factorial series	23 ₁	26- 29
FRANKLIN, P., Invariant sets of equations in Riemann space	25 ₄	485-500
— Analytic transformations of everywhere dense point sets	27 ₁	91-100
— Osculating curves and surfaces	28 ₃	400-416
— (with N. WIENER), Analytic approximations to topological transformations	28 ₄	762-785
GARABEDIAN, C. A., Circular plates of constant or variable thickness	25 ₃	343-398
GEHMAN, H. M., On extending a continuous (1-1) correspondence of two plane continuous curves to a correspondence of their planes	28 ₂	252-265
— Concerning acyclic continuous curves	29 ₃	553-568
— Concerning end points of continuous curves and other continua	30 ₁	63- 84
GLENN, O. E., A memoir upon formal invariancy with regard to binary modular transformations. Invariants of relativity	{ 21 ₃	285-312
	{ 22 ₄	543
GOUWENS, C., Invariants of the linear group modulo $\pi = p_1^{1} p_2^{\lambda_2} \dots p_n^{\lambda_n}$	26 ₄	435-440
GRAUSTEIN, W. C., Parallel maps of surfaces	23 ₃	298-332
— Representations of a complex point by pairs of ordered real points	24 ₄	245-254
— Isometric W -surfaces	26 ₂	176-204
— (with B. O. KOOPMAN), A necessary and sufficient condition that two surfaces be applicable	26 ₃	369-372

	VOL.	PAGES
GRAVES, L. M. (with T. H. HILDEBRANDT), Implicit functions and their differentials in general analysis.....	29 ₁	127-153
— Riemann integration and Taylor's theorem in general analysis.....	29 ₁	163-177
— Implicit functions and differential equations in general analysis.....	29 ₃	514-552
GREEN, G. M., Nets of space curves.....	21 ₂	207-236
GRONWALL, T. H., Differential variations in ballistics, with applications to the qualitative properties of the trajectory..	22 ₄	505-525
— The mutual inductance of two square coils.....	27 ₄	516-536
— On the zeros of the function $\beta(z)$ associated with the gamma function.....	{ 28 ₃ 28 ₄	391-399 786
GROVE, V. G., A theory of a general net on a surface.....	28 ₃	491-501
— A general theory of nets on a surface.....	29 ₄	801-814
— Transformations of nets.....	30 ₃	483-497
GUMMER, C. F., The relative distribution of the real roots of a system of polynomials.....	23 ₃	265-282
HARDY, G. H., On the representation of a number as the sum of any number of squares, and in particular of five.....	{ 21 ₃ 29 ₄	255-284 845-847
HART, W. L., Functions of infinitely many variables in Hilbert space.....	23 ₁	30- 50
HAZLETT, O. C., A theorem on modular covariants.....	21 ₂	247-254
— New proofs of certain finiteness theorems in the theory of modular covariants.....	22 ₂	144-157
— A symbolic theory of formal modular covariants.....	{ 24 ₄ 30 ₄	286-311 855
HEDRICK, E. R. (with L. INGOLD), Analytic functions in three dimensions.....	27 ₄	551-555
— (with L. INGOLD), The Beltrami equations in three dimensions.....	27 ₄	556-562
HILDEBRANDT, T. H. (with L. M. GRAVES), Implicit functions and their differentials in general analysis.....	29 ₁	127-153
HILLE, E., Oscillation theorems in the complex domain.....	23 ₄	350-385
— An existence theorem.....	26 ₂	241-248
HOSKINS, L. M., The strain of a gravitating sphere of variable density and elasticity.....	21 ₁	1- 43
HOTELLING, H., Three-dimensional manifolds of states of motion.....	27 ₃	329-344
— Multiple-sheeted spaces and manifolds of states of motion	28 ₃	479-490
HUBER, C. M., On the prime divisors of the cyclotomic functions.....	27 ₁	43- 48

	VOL.	PAGES
HUNTINGTON, E. V., A new set of postulates for betweenness, with proof of complete independence.	26 ₂	257-282
— Sets of independent postulates for the arithmetic mean, the geometric mean, the harmonic mean, and the root-mean-square.	29 ₁	1- 22
— The apportionment of representatives in Congress.	30 ₁	85-110
HURWITZ, W. A., An expansion theorem for a system of linear differential equations of the first order.	22 ₄	526-543
— On Bell's arithmetic of Boolean algebra.	30 ₂	420-424
HUTCHINSON, J. I., On a remarkable class of entire functions.	25 ₃	325-332
— On the roots of the Riemann zeta function.	27 ₁	49- 60
INGOLD, L. (with E. R. HEDRICK), Analytic functions in three dimensions.	27 ₄	551-555
— (with E. R. HEDRICK), The Beltrami equations in three dimensions.	27 ₄	556-562
— A symbolic treatment of the geometry of hyperspace.	27 ₄	574-599
INGRAHAM, M. H., A general theory of linear sets.	27 ₂	163-196
— Solution of certain functional equations relative to a general linear set.	28 ₂ 28 ₄	287-300 786
JACKSON, D., On the order of magnitude of the coefficients in trigonometric interpolation.	21 ₃	321-332
— On functions of closest approximation.	22 ₁	117-128
— On the convergence of certain trigonometric and polynomial approximations.	22 ₂	158-166
— Note on a class of polynomials of approximation.	22 ₃	320-326
— Note on an ambiguous case of approximation.	25 ₃	333-337
— On approximation by functions of given continuity.	25 ₃	449-458
— A generalized problem in weighted approximation.	26 ₁	133-154
— Some non-linear problems in approximation.	30 ₄	621-629
JENSEN, C. M., Some problems in the theory of interpolation by Sturm-Liouville functions.	29 ₁	54- 79
KAKEYA, S., Maximum modulus of some expressions of limited analytic functions.	22 ₄	489-504
KASNER, E., An algebraic solution of the Einstein equations.	27 ₁	101-105
— Solutions of the Einstein equations involving functions of only one variable.	27 ₂	155-162
— Transversality in space of three dimensions.	30 ₃	447-452
— The second derivative of a polygenic function.	30 ₄	803-818
KELLOGG, O. D. (with G. D. BIRKHOFF), Invariant points in function space.	23 ₁	96-115
— Some properties of spherical curves, with applications to the gyroscope.	25 ₄	501-524

	VOL.	PAGES
KEMPNER, A. J., Polynomials and their residue systems.	22 ₂	240-266
— Polynomials and their residue systems (continued).	22 ₃	267-288
— Polynomials of several variables and their residue systems.	27 ₃	287-298
KETCHUM, P. W., Analytic functions of hypercomplex variables.	30 ₄	641-667
KLINE, J. R., Concerning approachability of simple closed and open curves.	21 ₄	451-458
KOOPMAN, B. O. (with W. C. GRAUSTEIN), A necessary and sufficient condition that two surfaces be applicable.	26 ₃	369-372
— On rejection to infinity and exterior motion in the restricted problem of three bodies.	29 ₂	287-331
LANE, E. P., A general theory of conjugate nets.	23 ₃	283-297
— Ruled surfaces with generators in one-to-one correspondence.	25 ₂	281-296
— Bundles and pencils of nets on a surface.	28 ₁	149-167
— The contact of a cubic surface with an analytic surface.	29 ₃	471-480
— The projective differential geometry of systems of linear homogeneous differential equations of the first order.	30 ₄	785-796
LANGER, R. E., Developments associated with a boundary problem not linear in the parameter.	25 ₂	155-172
— On the momental constants of a summable function.	28 ₁	168-182
— On the theory of integral equations with discontinuous kernels.	28 ₄	585-639
— (with E. P. BROWN), On a class of integral equations with discontinuous kernels.	29 ₄	683-715
— (with J. D. TAMARKIN), On integral equations with discontinuous kernels.	30 ₃	453-471
LANGFORD, C. H., On a type of completeness characterizing the general laws for separation of point-pairs.	29 ₁	96-110
LAREW, G. A., The Hilbert integral and Mayer fields for the problem of Mayer in the calculus of variations.	26 ₁	61- 67
LEFSCHETZ, S., On certain numerical invariants of algebraic varieties with application to abelian varieties.	22 ₃	327-406
— On certain numerical invariants of algebraic varieties with application to abelian varieties (continued).	22 ₄	407-482
— Intersections and transformations of complexes and manifolds.	28 ₁	1- 49
— Manifolds with a boundary and their transformations.	{ 29 ₂ 29 ₄	{ 429-462 848
LESTOURGEON, E., Minima of functions of lines.	21 ₄	357-383
LEVY, H., Tensors determined by a hypersurface in Riemann space	28 ₄	671-694

	VOL.	PAGES
LIBMAN, E. E., The linear complex of conics.....	27 ₃	265-269
LINFIELD, B. Z., On certain polar curves with their application to the location of the roots of the derivatives of a rational function.....	25 ₂	239-258
LOGSDON, M. I., Complete groups of points on a plane cubic curve of genus one.....	27 ₄	474-490
LUBBEN, R. G., Concerning limiting sets in abstract spaces....	30 ₄	668-685
MCDONALD, J. H., On a class of polynomials in the theory of Bessel's functions.....	28 ₃	384-390
— The differential equation of the elliptic cylinder.....	29 ₄	647-682
MACDUFFEE, C. C., Invariantive characterizations of linear algebras with the associative law not assumed.....	23 ₂	135-150
— On covariants of linear algebras.....	26 ₁	124-132
MANNING, W. A., Simply transitive primitive groups.....	29 ₄	815-825
MARCH, H. W., The deflection of a rectangular plate fixed at the edges.....	27 ₃	307-317
MARIA, A. J., Functions of plurisegments.....	28 ₃	448-471
MATHEWS, R. M., Cubic curves and desmic surfaces.....	28 ₃	502-522
— Cubic curves and desmic surfaces, second paper.....	30 ₁	19- 23
MEARS, F. M., Riesz summability for double series.....	30 ₄	686-709
MICHAL, A. D., Functionals of r -dimensional manifolds ad- mitting continuous groups of point transformations.....	29 ₃	612-646
MILLER, G. A., Properties of the subgroups of an abelian prime power group which are conjugate under its group of isomorphisms.....	21 ₃	313-320
— I -conjugate operators of an abelian group.....	24 ₁	70- 78
— The subgroup composed of the substitutions which omit a letter of a transitive group.....	27 ₂	137-145
— Multiply transitive substitution groups.....	28 ₂	339-345
— Possible orders of two generators of the alternating and of the symmetric group.....	30 ₁	24- 32
MILNE, W. E., The behavior of a boundary value problem as the interval becomes infinite.....	30 ₄	797-802
MOORE, C. N., On the summability of the developments in Bessel's functions.....	21 ₂	107-156
— Generalized limits in general analysis, first paper.....	24 ₂	79- 88
— Generalized limits in general analysis, second paper....	25 ₄	459-468
— On convergence factors in multiple series.....	29 ₁	227-238
MOORE, R. L., Concerning simple continuous curves.....	21 ₃	333-347
— Concerning certain equicontinuous systems of curves....	22 ₁	41- 55
— Concerning upper semi-continuous collections of continua	27 ₄	416-428

	VOL.	PAGES
MORSE, H. M., Recurrent geodesics on a surface of negative curvature	22 ₁	84-100
— A fundamental class of geodesics on any closed surface of genus greater than one	26 ₁	25- 60
— Relations between the critical points of a real function of n independent variables	27 ₃	345-396
— The foundations of a theory in the calculus of variations in the large	30 ₂	213-274
MULLIKIN, A. M., Certain theorems relating to plane connected point sets	24 ₂	144-162
MURRAY, F. H., A type of differential system containing a parameter	25 ₃	315-324
— On certain families of orbits with arbitrary masses in the problem of three bodies	28 ₁	74-108
— On certain families of orbits with arbitrary masses in the problem of three bodies, second paper	29 ₄	848
NELSON, A. L., Pseudo-canonical forms and invariants of systems of partial differential equations	22 ₂	180-197
NIEMYTZKI, V. W., On the "third axiom of metric space"	29 ₃	507-513
NÖRLUND, N. E., Sur certaines équations aux différences finies . .	25 ₁	13- 98
OLSON, H. L., Congruences with constant absolute invariants . .	27 ₁	15- 42
ORE, O., Some theorems on the connection between ideals and group of a Galois field	30 ₃	610-620
OSGOOD, W. F., On the gyroscope	23 ₃	240-264
— On normal forms of differential equations	27 ₁	1- 14
PELL, A. J., Linear equations with two parameters	23 ₂	198-211
PIERPONT, J., Optics in hyperbolic space	30 ₁	33- 48
PÓLYA, G., On the mean-value theorem corresponding to a given linear homogeneous differential equation	24 ₄	312-324
RAINICH, G. Y., Electrodynamics in the general relativity theory	27 ₁	106-136
RAWLES, T. H., The invariant integral and the inverse problem in the calculus of variations	30 ₄	765-784
REYNOLDS, C. N., On the zeros of solutions of homogeneous linear differential equations	22 ₂	220-229
RICHARDSON, R. G. D., A new method in the equivalence of pairs of bilinear forms	26 ₄	451-478
— Relative extrema of pairs of quadratic and hermitian forms	26 ₄	479-494
— A problem in the calculus of variations with an infinite number of auxiliary conditions	27 ₄	600
— A problem in the calculus of variations with an infinite number of auxiliary conditions	30 ₁	155-189
RICHMOND, D. E., Geodesics on surfaces of genus zero with knobs	30 ₁	49- 62

	VOL.	PAGES
RIDER, P. R., The figuratrix in the calculus of variations.....	28 ₄	640-653
— A figuratrix for double integrals.....	29 ₂	421-428
RIETZ, H. L., On the representation of a certain fundamental law of probability.....	27 ₂	197-212
RITT, J. F., On the iteration of rational functions.....	21 ₃	348-356
— Periodic functions with a multiplication theorem.....	23 ₁	16- 25
— Prime and composite polynomials.....	23 ₁	51- 66
	23 ₄	431
— On algebraic functions which can be expressed in terms of radicals.....	24 ₁	21- 30
	24 ₄	324
— On the integrals of elementary functions.....	25 ₂	211-222
— Permutable rational functions.....	25 ₃	399-448
	26 ₄	494
— Equivalent rational substitutions.....	26 ₂	221-229
— Elementary functions and their inverses.....	27 ₁	68- 90
— Meromorphic functions with addition or multiplication theorems.....	29 ₂	341-360
— Real functions with algebraic addition theorems.....	29 ₂	361-368
— A factorization theory for functions $\sum_{i=1}^n a_i e^{\alpha_i x}$	29 ₃	584-596
ROBERTSON, H. P., Dynamical space-times which contain a conformal euclidean 3-space.....	29 ₃	481-496
ROBISON, G. M., Divergent double sequences and series.....	28 ₁	50- 73
ROOS, C. F., Generalized Lagrange problems in the calculus of variations.....	30 ₂	360-384
ROTH, W. E., A solution of the matrix equation $P(X) = A$	30 ₃	579-596
RUTLEDGE, G., Maclaurin expansion of the interpolation polynomial determined by $2n+1$ evenly spaced points.....	26 ₁	113-123
SCHMIDT, K., The theory of functions of one Boolean variable..	23 ₂	212-222
SCHOUTEN, J. A., On the conditions of integrability of covariant differential equations.....	27 ₄	441-473
SHARPE, F. R. (with V. SNYDER), Certain types of involutorial space transformations.....	21 ₁	52- 78
— (with V. SNYDER), The construction of algebraic correspondences between two algebraic curves.....	22 ₁	31- 40
— (with V. SNYDER), The (1, 2) correspondence associated with the cubic space involution of order two.....	25 ₁	1- 12
SHAW, J. B., On triply orthogonal congruences.....	21 ₄	391-408
— General vector calculus.....	24 ₃	195-244
SHEFFER, I. M., Systems of equations in an infinity of unknowns, whose solution involves an arbitrary parameter.....	28 ₂	266-286

	VOL.	PAGES
SHOHAT, J. A. (CHOKHATE, J.), On the development of continuous functions in series of Tchebycheff polynomials.	27 ₄	537-550
— On a general formula in the theory of Tchebycheff polynomials and its applications.	29 ₃	569-583
SILVERMAN, L. L., The equivalence of certain regular transformations.	26 ₁	101-112
SIMMONS, H. A., The first and second variations of a double integral for the case of variable limits.	28 ₂	235-251
SIMONDS, E. F., Invariants of infinite groups in the plane.	21 ₄	384-390
SLOTNICK, M. M., A contribution to the theory of fundamental transformations of surfaces.	30 ₁	190-212
SMITH, H. L., On the existence of the Stieltjes integral.	27 ₄	491-515
— On relative content and Green's lemma.	30 ₂	405-419
SNYDER, V. (with F. R. SHARPE), Certain types of involutorial space transformations.	21 ₁	52- 78
— (with F. R. SHARPE), The construction of algebraic correspondences between two algebraic curves.	22 ₁	31- 40
— (with F. R. SHARPE), The (1, 2) correspondence associated with the cubic involution of order two.	25 ₁	1- 12
SPEISER, A., Die Zerlegung von Primzahlen in algebraischen Zahlkörpern.	23 ₂	173-178
STARKE, E. P., Certain uniform functions of rational functions.	29 ₂	276-286
STONE, M. H., An unusual type of expansion problem.	26 ₃	335-355
— A comparison of the series of Fourier and Birkhoff.	28 ₄	695-761
— Irregular differential systems of order two and the related expansion problems.	29 ₁	23- 53
— The expansion problems associated with regular differential systems of the second order.	29 ₄	826-844
STOUFFER, E. B., On the independence of principal minors of determinants.	26 ₃	356-368
— Singular ruled surfaces in space of five dimensions.	29 ₁	80- 95
STURDIVANT, J. H., Second-order linear systems with summable coefficients.	30 ₃	560-566
SYNGE, J. L., A generalization of the riemannian line-element.	27 ₁	61- 67
TAMARKIN, J. D., On Laplace's integral equations.	28 ₃	417-425
— On Volterra's integro-functional equation.	28 ₃	426-431
— The notion of the Green's function in the theory of integro-differential equations.	29 ₄	755-800
— (with R. E. LANGER), On integral equations with discontinuous kernels.	30 ₃	453-471
TAYLOR, J. H., A generalization of Levi-Civita's parallelism and the Frenet formulas.	27 ₂	246-264

	VOL.	PAGES
THOMAS, J. M., Asymmetric displacement of a vector.....	28 ₄	658-670
THOMAS, T. Y. (with O. VEBLEN), The geometry of paths.....	25 ₄	551-608
— (with O. VEBLEN), Extensions of relative tensors.....	26 ₃	373-377
TURNER, J. S., A fundamental system of invariants of a modular group of transformations.....	24 ₂	129-134
USPENSKY, J. V., On Jacobi's arithmetical theorems concerning the simultaneous representation of numbers by two different quadratic forms.....	30 ₂	385-404
— On the convergence of quadrature formulas related to an infinite interval.....	30 ₃	542-559
VAN DE WALLE, W. E., On the complete independence of the postulates for betweenness.....	26 ₂	249-256
VANDIVER, H. S., Application of the theory of relative cyclic fields to both cases of Fermat's last theorem.....	28 ₃	554-560
— Application of the theory of relative cyclic fields to both cases of Fermat's last theorem, second paper.....	29 ₁	154-162
VAN VLECK, E. B., Non-loxodromic substitutions and groups in n dimensions.....	24 ₄	255-273
VEBLEN, O., The intersection numbers.....	25 ₄	540-550
— (with T. Y. THOMAS), The geometry of paths.....	25 ₄	551-608
— (with T. Y. THOMAS), Extensions of relative tensors.....	26 ₃	373-377
VINGRADOV, J. M., On a general theorem concerning the distri- bution of the residues and non-residues of powers.....	29 ₁	209-217
— On the bound of the least non-residue of n th powers.....	29 ₁	218-226
WALSH, J. L., On the location of the roots of the jacobian of two binary forms, and of the derivative of a rational function..	22 ₁	101-116
— A generalization of the Fourier cosine series.....	22 ₂	230-239
— Some two-dimensional loci connected with cross ratios...	23 ₁	67- 88
— On the location of the roots of the jacobian of two binary forms, and of the derivative of a rational function.....	24 ₁	31- 69
— On the location of the roots of certain types of poly- nomials.....	24 ₃	163-180
— On the expansion of analytic functions in series of poly- nomials.....	26 ₂	155-170
— On the expansion of analytic functions in series of poly- nomials and in series of other analytic functions.....	30 ₂	307-332
— On approximation to an arbitrary function of a complex variable by polynomials.....	30 ₃	472-482
— On the degree of approximation to an analytic function by means of rational functions.....	30 ₄	838-847
WARD, L. E., Some third-order irregular boundary value problems.....	29 ₄	716-745

	VOL.	PAGES
WEDDERBURN, J. H. M., On division algebras	22 ₂	129-135
— Algebras which do not possess a finite basis	26 ₄	395-426
WEISS, M. J., Primitive groups which contain substitutions of prime order p and of degree $6p$ or $7p$	30 ₂	333-359
WHITE, H. S., A property of two $(n+1)$ -gons inscribed in a norm-curve in n -space	22 ₁	80- 83
WHYBURN, G. T., Concerning continua in the plane.	29 ₂	369-400
— Concerning point sets which can be made connected by the addition of a simple continuous arc.	29 ₄	746-754
— Concerning the cut points of continua.	30 ₃	597-609
WHYBURN, W. M., Second-order differential systems with integral and k -point boundary conditions.	30 ₄	630-640
— Existence and oscillation theorems for non-linear differen- tial systems of the second order.	30 ₄	848-854
WIDDER, D. V., A general mean-value theorem.	26 ₃	385-394
— A generalization of Taylor's series.	30 ₁	126-154
WIENER, N., A set of postulates for fields.	21 ₂	237-246
— Discontinuous boundary conditions and the Dirichlet problem.	25 ₃ 26 ₄	307-314 494
— (with P. FRANKLIN), Analytic approximations to topo- logical transformations.	28 ₄	762-785
WILCZYNSKI, E. J., One parameter families and nets of ruled surfaces and a new theory of congruences.	21 ₂	157-206
— A set of properties characteristic of a class of congruences connected with the theory of functions.	21 ₄	409-445
— Some generalizations of geodesics.	23 ₃	223-239
WILDER, C. E., Differential geometry of an m -dimensional manifold in a euclidean space of n dimensions.	25 ₁	99-122
— Reduction of the ordinary linear differential equation of the n th order whose coefficients are certain polynomials in a parameter to a system of n first-order equations which are linear in the parameter.	29 ₃	497-506
WILDER, R. L., A connected and regular point set which has no subcontinuum.	29 ₂	332-340
WILLIAMS, K. P., A uniqueness theorem for the Legendre and Hermite polynomials.	26 ₄	441-445
— Non-synchronized relative invariant integrals.	28 ₁	198-206
WILLIAMS, W. L. G., Fundamental systems of formal modular seminvariants of the binary cubic.	22 ₁	56- 79
— Fundamental systems of formal modular protomorphs of binary forms.	28 ₁	183-197

	VOL.	PAGES
WILLIAMSON, J., Conditions for associativity of division algebras connected with non-abelian groups.....	30 ₁	111-125
WILSON, N. R., Integers and basis of a number field.....	29 ₁	111-126
WILSON, W. A., On the oscillation of a continuum at a point..	27 ₄	429-440
— Some properties of limited continua, irreducible between two points.....	28 ₈	536-553
WOOD, F. E., On certain relations between the projective theory of surfaces and the projective theory of congruences.....	23 ₄	386-408
WOODS, R., The elliptic modular functions associated with the elliptic norm curve E^7	23 ₂	179-197
ZARYCKI, M., Allgemeine Eigenschaften der Cantorsche Kohärenzen.....	30 ₈	498-506