

theory to observation and they are therefore somewhat outside the province of a mathematical society. It is interesting to notice, however, that while most of the papers have been published since 1880, we have one by George Hadley dated 1735. Another by Poisson (1837) is on a subject which has received attention once again, namely, the motion of projectiles taking into account the rotation of the earth.

E. W. BROWN.

NOTES.

THE April number (volume 15, number 2) of the *Transactions of the American Mathematical Society* contains the following papers: "Sur la notion de différentielle d'une fonction de ligne," by M. FRÉCHET; "A type of primitive algebra," by J. H. M. WEDDERBURN; "Properties of surfaces whose asymptotic curves belong to linear complexes," by C. T. SULLIVAN; "Relatively uniform convergence of sequences of functions," by E. W. CHITTENDEN; "Note on Fermat's last theorem," by H. S. VANDIVER; "A set of axioms for line geometry," by E. R. HEDRICK and L. INGOLD; "The Cauchy problem for integro-differential equations," by G. C. EVANS.

THE March number (volume 15, number 3) of the *Annals of Mathematics* contains the following papers: "On continued fractions in non-commutative quantities," by J. H. M. WEDDERBURN; "A new type of solution of Maxwell's equations," by H. BATEMAN; "Relation between the zeros of a rational integral function and its derivate," by T. HAYASHI; "The invariants, seminvariants, and linear covariants of the binary quartic form modulo 2," by L. E. DICKSON; "Examples of normal domains of rationality belonging to elementary groups," by G. A. MILLER; "On Lebesgue's constants in the theory of Fourier series," by T. H. GRONWALL; "The linear difference equation of the first order," by K. P. WILLIAMS; "Geometric properties of the Jacobians of a certain system of functions," by A. EMCH; "On the irregular integrals of linear differential equations," by C. E. LOVE.

At the meeting of the London mathematical society held

March 12 the following papers were read: By W. BURNSIDE, "The rational solutions of the equation $x^3 + y^3 + z^3 = 0$ in quadratic fields"; by H. HILTON and Miss R. E. COLOMB, "Orthoptic and isoptic loci of plane curves"; by G. H. HARDY, "The roots of the Riemann ζ function"; by T. J. I'A. BROMWICH, "Normal coordinates in dynamics."

THE royal Belgian academy of sciences announces the following prize problems for the year 1915:

"An important contribution to the infinitesimal geometry of curved surfaces."

"Summarize the works on systems of conics in space, and add new investigations of these systems."

Competing memoirs should be sent to the secretary before August 1, 1915. The value of each prize is 800 francs.

UNIVERSITY OF CHICAGO.—The following courses are announced for the summer quarter, 1914:—By Professor E. H. MOORE: Linear integral equations, four hours; Solid analytical geometry, four hours.—By Professor G. A. BLISS: Differential geometry, four hours.—By Professor D. R. CURTISS: Theory of functions, four hours.—By Professor L. E. DICKSON: Linear associative algebras, four hours; Theory of equations, four hours.—By Professor K. LAVES: Analytical mechanics, four hours.—By Professor F. R. MOULTON: The problem of three bodies, four hours.—By Professor H. E. SLAUGHT: Elliptic integrals, four hours.—By Professor J. W. A. YOUNG: Critical review of secondary mathematics, four hours.

DARTMOUTH COLLEGE.—The following courses are announced for the summer session, July 6 to August 15, 1914:—By Professor A. D. PITCHER: Principles of the calculus.—By Professor E. G. BILL: Solid analytical geometry; Advanced aspects of elementary geometry (primarily for teachers).—By Dr. F. M. MORGAN: Higher geometry; The teaching of elementary algebra.

THE following university courses in mathematics are announced for the present summer semester:

UNIVERSITY OF BERLIN.—By Professor H. A. SCHWARZ: Elementary geometric establishment of the most important properties of conics, two hours; Space curves and surfaces,

four hours; Calculus of variations, four hours; Colloquium, two hours; Seminar, two hours.—By Professor G. FROBENIUS: Theory of determinants, four hours; Seminar, two hours.—By Professor F. SCHOTTKY: Analytic geometry, four hours; Theory of theta functions, four hours; Seminar, two hours.—By Professor G. HETTNER: Introduction to ordinary differential equations, two hours.—By Professor J. B. KNOBLAUCH: Integral calculus, with exercises, five hours; Applications of elliptic functions, four hours.—By Professor R. LEHMANN-FILHÉS: Analytic mechanics, with exercises, five hours.—By Dr. K. KNOPP: Differential calculus, with exercises, five hours; Infinite series, products, and continued fractions, four hours.

UNIVERSITY OF BONN.—By Professor E. STUDY: Theory of elliptic functions, four hours; Seminar, two hours.—By Professor F. LONDON: Descriptive geometry, with exercises, four hours; Analytic geometry, II, three hours.—By Professor I. SCHUR: Theory of numbers, two hours; Theory of Fourier series, two hours; Seminar, two hours.—By Dr. J. O. MÜLLER: Introduction to the calculus, with exercises, four hours; Introduction to geodesy, with exercises, two hours; Seminar, two hours.

UNIVERSITY OF GÖTTINGEN.—By Professor D. HILBERT: Differential equations, four hours; Selected chapters of statistical mechanics, two hours; Seminar, two hours.—By Professor E. LANDAU: Differential and integral calculus, with exercises, four hours; Theory of finite groups, four hours.—By Professor C. CARATHÉODORY: Functions of real variables, four hours; Seminar, two hours.—By Professor C. RUNGE: Numerical calculation, four hours; Exercises on graphical methods, two hours.—By Dr. E. HECKE: Theory of functions of a complex variable, four hours; Exercises in differential equations, two hours.—By Dr. L. v. SANDEN: Descriptive geometry, four hours; Technical mechanics, with exercises, three hours.—By Professor F. BERNSTEIN: Theory of probabilities, three hours; Mathematics of insurance, two hours.—By Dr. R. COURANT: Analytic geometry, with exercises, six hours.—By —: Algebra, four hours.

UNIVERSITY OF LEIPZIG.—By Professor K. ROHN: Descriptive geometry, with exercises, four hours; Algebraic curves,

with exercises, five hours.—By Professor O. HÖLDER: Functions of a complex variable, four hours; Calculus of variations, two hours; Seminar, two hours.—By Professor G. HERGLOTZ: Plane analytic geometry, with exercises, five hours; Algebraic analysis, two hours; Seminar, two hours.—By Professor P. KOEBE: Theory of numbers, two hours; Differential equations, four hours.—By Dr. R. KÖNIG: Algebraic functions, two hours.

THE completion by Professor L. KOENIGSBERGER of the one hundredth semester of his academic career was celebrated at the University of Heidelberg on February 28.

DR. R. KÖNIG, of the University of Leipzig, has been appointed associate professor of mathematics at the University of Tübingen.

DR. W. VOGT, of the technical school at Carlsruhe, has been appointed associate professor of mathematics at the University of Heidelberg.

DR. E. A. ANSEL has been appointed docent in mathematics and astronomy at the University of Freiburg.

DR. W. BEHRENS has been appointed docent in mathematics at the University of Göttingen.

DR. G. BERNDT, of the University of Halle, has been appointed docent in mathematics at the technical school of Berlin.

DR. L. FÖPPL has been appointed docent in mathematics at the University of Würzburg.

DR. A. LACKNER has been appointed docent in geometry at the technical school of Vienna.

AT the University of Cambridge, Mr. G. H. HARDY has been appointed Cayley lecturer in mathematics, and Mr. ARTHUR BERRY a university lecturer in mathematics.

AT the University of Chicago, Professor E. J. WILCZYNSKI has been promoted to a full professorship of mathematics.

DR. T. H. GRONWALL, of Princeton University, has been appointed to an assistant professorship of mathematics at Oberlin College.

PROFESSOR H. D. THOMPSON, of Princeton University, has been granted leave of absence for the academic year 1914-15.

PROFESSOR B. H. CAMP, of Wesleyan University, has been promoted to a full professorship of mathematics.

PROFESSOR W. T. DUTTON, of Allegheny College, died March 24 at the age of 62 years.

PROFESSOR G. M. MINCHIN, formerly of the royal Indian engineering college, died March 23 at the age of 68 years.

DR. J. S. MACKAY died at Edinburgh on March 25, in his 71st year.

DR. G. W. HILL, third president of the American Mathematical Society, died at West Nyack, N. Y., on April 16, at the age of 76 years.

CHARLES S. S. PEIRCE, eminent for his researches in mathematical logic, died at Milford, Pa., on April 19, at the age of 75 years.

NEW PUBLICATIONS.

I. HIGHER MATHEMATICS.

- ACH (N.). Ueber die Erkenntnis a priori insbesondere in der Arithmetik. Leipzig, Quelle & Meyer, 1913.
- ARMSTRONG (C. N.). Eine Untersuchung der Anwendbarkeit rekurrenter Reihen zur Aufsuchung versteckter Periodizitäten. (Diss.) München, 1913. 8vo. 96 pp.
- BARTHEL (E.). Die Erde als Totalebene. Hyperbolische Raumtheorie mit einer Voruntersuchung über die Kegelschnitte. Leipzig, Hillmann, 1914. 8vo. 7+111 pp. M. 2.50
- BLAHA (V.). Transzendente Zahlen, insbesondere e und π . (Progr.) Wien, 1913. 8vo. 80 pp.
- CAPPELLETTI (G.). Numeri primi. Teoria e applicazioni. Cenno sui numeri perfetti e amabili. Verona, Cinquetti, 1913. 8vo. 30 pp. L. 0.50