projection along a bisecant and along a tangent are clearly explained, also from a point in the osculating plane. Cones and developables, together with their curves of intersection, ruled surfaces and helicoids complete the volume.

The presentation is too concise for a first reading, but the volume is not meant for this purpose. It is rather for the teacher who already knows something of the various methods and wishes to know their mutual relations. At the end of each chapter a generous list of books and monographs is given which add greatly to the value of the book. It is a curious fact that not a single American work is mentioned.

VIRGIL SNYDER.

## NOTES.

THE December number (volume 16, number 2) of the *Annals of Mathematics* contains the following papers: "A substitute for Duhamel's theorem," by G. A. BLISS; "The points of inflexion of a plane cubic curve," by L. E. DICKSON; "Properties of four confocal parabolas whose vertical tangents form a square," by C. M. HERBERT; "Some remarks on conformal representation," by T. H. GRONWALL; "On the maximum modulus of an analytic function," by T. H. GRONWALL; "Note on the simple difference equation," by J. H. M. WEDDERBURN; "Note on the rank of a symmetrical matrix. II," by J. H. M. WEDDERBURN.

AT the Philadelphia meeting of the American association for the advancement of science Professor W. W. CAMPBELL was elected president, and Dr. L. O. HOWARD was reëlected permanent secretary for a term of five years. Professor A. O. LEUSCHNER was elected vice-president of Section A. The Association will hold a summer meeting at San Francisco, August 2–7, and a winter meeting at Columbus, Ohio, next December. A convocation week meeting will be held in New York City in 1916–1917.

THE Paris academy of sciences announces the following prize problems. The Bordin prize (3,000 fr.) for 1915 for a noteworthy contribution to the theory of curves of constant torsion, in particular of algebraic curves, with special emphasis

on rational curves; the grand prize (3,000 fr.) for 1916 for the application of the methods of Poincaré to the integration of linear differential equations of the first order; the Bordin prize (3,000 fr.) for 1917 for the arithmetic theory of non-quadratic forms; the Vaillant prize (4,000 fr.) for 1917 for the determination of all surfaces which can be generated in two ways by the displacement of a rigid curve.

THE following courses in mathematics are being given during the present semester.

UNIVERSITY OF BERLIN.—By Professor H. A. SCHWARZ: Differential calculus, with exercises, five hours; Problems in conformal representation, two hours; Seminar, two hours; Colloquium, two hours.—By Professor G. FROBENIUS: Algebra, four hours; Seminar, two hours.—By Professor F. SCHOTTKY: General theory of functions, four hours; Theory of the potential, four hours; Seminar, two hours.—By Professor J. KNOBLAUCH: Surfaces and space curves, four hours; Problems in mathematical pedagogy, four hours; Selected chapters in elliptic functions, two hours.—By Dr. A. KNOPP: Integral calculus, with exercises, five hours; Theory of infinite series, II, four hours.—By Professor F. R. HELMERT: Method of least squares, one hour.

UNIVERSITY OF FRANKFORT.—By Professor A. SCHOEN-FLIES: Projective geometry, four hours; Theory of sets, with exercises, two hours; Seminar, two hours.—By Professor E. HELLINGER: Differential equations, with exercises, four hours; Theory of integral equations, three hours.—By Dr. O. SZASZ: Theory of numbers, with exercises, three hours; Theory of continued fractions, two hours.—By Professor M. BRENDEL: Celestial mechanics, three hours; Mathematics of insurance, two hours.

UNIVERSITY OF GÖTTINGEN.—By Professor D. HILBERT: Principles of mathematics, four hours; Seminar, two hours.—By Professor E. LANDAU: Differential and integral calculus, II, with exercises, five hours; Seminar, two hours.—By Professor C. RUNGE: Graphical methods, with exercises, six hours; Seminar, two hours.—By Dr. H. v. SANDEN: Mathematical treatment of the natural sciences, three hours; Projective geometry, with exercises, four hours; Theory of mathematical

instruments, three hours; Colloquium, two hours.—By Dr. E. HECKE: Curves and surfaces, four hours; Applications of the theory of functions to algebra, two hours.—By Dr. H. BEHRENS: Elementary theory of numbers, four hours; Galois theory of equations, two hours.—By Dr. R. COURANT: Selected chapters of elementary mathematics, three hours; Partial differential equations of mathematical physics, four hours; Selected chapters in the theory of functions, two hours.—By Dr. F. BERNSTEIN: Mathematical statistics and biometrics, two hours; Mathematics of insurance, four hours; Seminar, two hours.

UNIVERSITY OF LEIPZIG.—By Professor O. HÖLDER: Elliptic functions, four hours; Theory of algebraic equations, two hours; Seminar, two hours.—By Professor K. ROHN: Differential geometry, with exercises, five hours; Descriptive geometry, with exercises, four hours.—By Professor G. HERGLOTZ: Differential and integral calculus, with exercises, six hours; Analytic geometry of space, three hours.—By Professor H. BRUNS: Theory of errors, two hours; Practical analysis, two hours.

UNIVERSITY OF STRASSBURG.—By Professor F. SCHUR: Projective geometry, four hours; Foundations of geometry, four hours; Seminar, two hours.—By Professor G. FABER: Algebra, four hours; Partial differential equations, four hours; Seminar, two hours.—By Professor M. SIMON: History of mathematics in the middle ages, four hours.—By Professor J. WELLSTEIN: Differential and integral calculus, with exercises, five hours.—By Professor R. v. MISES: Analytic geometry, four hours; Mechanics of rigid bodies, four hours; Seminar, two hours.—By Professor S. EPSTEIN: Hypergeometric differential equations, four hours.—By Dr. A. SPEISER: Analytic functions and Riemann surfaces, four hours.

DR. H. FALCKENBERG has been appointed docent in mathematics at the technical school at Brunswick.

DR. G. PÓLYA has been appointed docent in mathematics at the technical school of Zürich.

DR. E. ROSATI has been appointed docent in geometry at the University of Pisa.

DR. A. TONOLO has been appointed docent in mathematics at the University of Padua.

DR. A. ARMELLINI has been appointed docent in celestial mechanics at the University of Rome.

MR. A. BERRY has been appointed lecturer in mathematics at the University of Cambridge.

PROFESSOR J. N. HATZIDAKIS, of the University of Athens, has retired from active teaching with the title of professor emeritus.

PROFESSORS S. JOLLES and G. SCHEFFERS, of the technical school of Berlin, have received the title of Geheimer Regierungsrat.

PROFESSORS A. BRILL, of the University of Tübingen, and M. PLANCK, of the University of Berlin, have been elected members of the Accademia dei Lincei of Rome.

DR. G. P. THOMSON has been appointed lecturer in mathematics at Corpus Christi College, Cambridge.

AT the Georgia School of Technology, Mr. D. M. SMITH has been promoted to an assistant professorship of mathematics.

PROFESSOR R. M. BARTON, of the University of New Mexico, has been appointed professor of mathematics in Lombard College.

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# NEW PUBLICATIONS.

## I. HIGHER MATHEMATICS.

AUBERT (P.) et PAPELIER (G.). Exercises de géométrie analytique. Paris, Vuibert, 1914. 8vo. 360 pp. Fr. 6.00

BARRAU (J. A.). Ruimtezin en ruimteleer. Groningen, 1913. 8vo. 24 pp.

BERLINER (P. H.). Involutionssysteme in der Ebene des Dreiecks. Braunschweig, Vieweg, 1914. 8vo. 12+212 pp. M. 8.00

COBB (C. W.). Asymptotic development for a certain integral function of zero order. (Diss., University of Michigan.) Norwood, Mass., Norwood Press, 1913. Privately printed. 12mo. 13 pp.

DOWLING (L. E.) and TURNEAURE (F. E.). Analytic geometry. New York, Holt, 1914. 12+266 pp. $1.60