NOTES.

THE July number (volume 8, number 3) of the *Transactions* of the AMERICAN MATHEMATICAL SOCIETY contains the following papers: "General theory of approximation by functions involving a given number of arbitrary parameters," by J. W. YOUNG; "On derivatives over assemblages," by E. R. HEDRICK; "Geometrie proiettive di congruenza e geometrie proiettive finite," by B. LEVI; "Collineations in a finite projective geometry," by O. VEBLEN; "Geometry in which the sum of the angles of every triangle is two right angles," by R. L. MOORE; "Non-desarguesian and non-pascalian geometries," by O. VEBLEN and J. H. MACLAGAN-WEDDERBURN; "Modular theory of group matrices," by L. E. DICKSON; "Existence proof for a field of extremals tangent to a given curve," by O. BOLZA; "A new form of the simplest problem of the calculus of variations," by G. A. BLISS; "On certain isothermic surfaces," by A. E. YOUNG.

THE University of Illinois has been added to the list of institutions contributing to the support of the *Transactions*.

THE concluding (July) number of volume 8 of the *Annals of Mathematics* contains: "Multiply perfect numbers of four different primes," by R. D. CARMICHAEL; "On a system of parastroids," by R. P. STEPHENS; "A peculiar example in minima of surfaces," by E. R. HEDRICK: "On maximum and minimum values of the modulus of a polynomial," by D. N. LEHMER; "On the minimum surface of revolution in the case of one variable end point," by Miss M. E. SINCLAIR; "On the polynomial convergents of a power series," by M. B. PORTER.

THE annual list of American doctorates published in *Science* presents for the academic year 1906–1907 327 names, of which 168 are credited to the sciences. The following 13 successful candidates offered mathematics as major subject (the titles of the theses are appended): Miss F. A. ALLEN, Wisconsin, "On the determination of cyclic involutions of order three"; C. S. ATCHISON, Johns Hopkins, "Curves with a directrix"; G. D. BIRKHOFF, Chicago, "Asymptotic properties of certain ordinary differential equations with applications to boundary value and expansion problems"; W. C. BRENKE, Harvard, "A con-

tribution to the theory of trigonometric and zonal harmonic series"; H. H. CONOVER, Yale, "On certain problems in the calculus of variations"; A. E. LANDRY, Johns Hopkins, "A geometric interpretation of binary syzygies"; R. MORRIS, Cornell, "On the automorphic functions of the group (0, 3; l_1, l_2, l_3)"; F. W. REED, Virginia, "Singular points in the approximate development of the perturbation function"; A. RANUM, Chicago, "A new kind of congruence groups"; F. R. SHARPE, Cornell, "The general circulation of the atmosphere"; W. B. STONE, Virginia, "The groups of two, three, and four parameters in space and their differential invariants"; A. L. UNDERHILL, Chicago, "Invariants under point transformations in the calculus of variations"; B. M. WALKER, Chicago, "On the resolution of higher singularities of algebraic curves into ordinary double points."

The number of American doctorates in mathematics for each year of the last decade is 11, 13, 11, 18, 8, 7, 14, 21, 11, 13.

THE last annual list of members of the London mathematical society contains 280 names, including 27 Americans and 13 honorary members. The society was founded in 1865, as the outgrowth of the students' mathematical clubs, to a large extent through the efforts of Professor A. DeMorgan, who was made its first president. The last of the original charter members was the late Dr. E. J. Routh. Steps were at once taken to publish papers read before the society, the first volume of the *Proceedings* appearing in 1870, and a volume has appeared every year since. An index of authors of papers published in the first thirty volumes was issued in 1900; in 1902 the size of the page was increased, and larger type employed. In this new series the reports of the meetings appear at the beginning of the volume. The list of papers read at each monthly meeting has regularly appeared in the BULLETIN. In honor of its first president, the society in 1884 founded the DeMorgan medal, which is awarded every three years for exceptional merit. The list of medallists is Professors Cayley, Sylvester, Lord Rayleigh, Klein, S. Roberts, W. Burnside, Greenhill, Baker. The next award will be made in 1908. The officers for the present year are: president, Professor W. BURNSIDE; secretaries, Professor A. E. H. LOVE and Mr. J. H. GRACE; two vice-presidents, treasurer and ten other members of the council. The next election will he held November 14, 1907.

THE *Revista trimestral de Matemáticas*, founded six years ago by Professor J. RUIS Y CASAS of Zaragoza, was discontinued with the completion of number 21, which appeared last spring. In its place a new periodical has been founded, with the title, *Anales de la Facultad de Ciencias de Zaragoza*, which will contain memoirs from the sciences of mathematics, physics, chemistry, astronomy, meteorology and the natural sciences.

THE academy of sciences of Copenhagen announces the following prize problem, for the solution of which it will award the gold medal of the society: "To complete, by new results, the theory of the plane or of an algebraic surface, the points of which correspond reciprocally." Competing memoirs must be written in Danish, Swedish, English, German, French or Latin, and sent to the secretary, Professor H. G. Zeuthen, before October 31, 1908.

THE various German universities offer the following courses in mathematics during the winter semester of 1907–08.

UNIVERSITY OF BERLIN. — By Professor H. A. SCHWARZ: Analytic geometry, four hours; Applications of elliptic functions, four hours; Examples in conformal mapping, two hours; Colloquium, two hours; Seminar, two hours. — By Professor G. FROBENIUS: Theory of numbers, four hours; Seminar, two hours. — By Professor F. SCHOTTKY: Theory of curves and surfaces, four hours; Linear differential equations and automorphic functions, four hours; Seminar, two hours. — By Professor G. HETTNER: Infinite series, products and continued products, two hours. — By Professor J. KNOBLAUCH: Differential calculus, four honrs; Theory of elliptic functions, four hours. — By Professor E. LANDAU: Integral equations, four hours. — By Dr. I. SCHUR: Theory of algebraic equations, four hours; Linear substitutions, two hours. — By Professor R. LEHMANN-FILHÈS: Integral calculus, four hours. — By Dr. J. ASCHKINASS: Elements of higher mathematics for students of science, four hours.

UNIVERSITY OF BONN. — By Professor E. STUDY: Introduction to the theory of functions, four hours; Introduction to quaternions, one hour; Seminar, two hours. — By Professor F. LONDON: Advanced calculus, four hours; with exercises, one hour; Synthetic geometry, two hours; Exercises in descriptive geometry, two hours; Seminar, two hours. — By Professor G.

KOWALEWSKI: Analytic geometry of the plane and of space, four hours; with exercises, one hour; Introduction to the theory of groups of transformations, two hours.— By Dr. E. SCHMIDT: Partial differential equations, four hours.

UNIVERSITY OF GÖTTINGEN.— By Professor F. KLEIN: Elementary mathematics from a higher standpoint, four hours; Seminar, two hours.— By Professor D. HILBERT: Theory of partial differential equations, four hours; Integral equations, two hours; Seminar, two hours.— By Professor H. MINKOWSKI: Theory of functions, four hours; Selected chapters of the theory of numbers, two hours; Seminar, two hours.— By Professor C. RUNGE: Graphical methods, four hours; with exercises, two hours; Seminar, two hours.— By ——: The basis of insurance, three hours; Seminar.— By Professor E. ZERMELO: The mathematical basis of logic, two hours. — By Dr. G. HERGLOTZ: Algebra, four hours; Exercises in differential equations, two hours.— By Dr. C. CARATHÉODORY: Advanced calculus, four hours; with exercises, two hours.— By Dr. P. KOEBE: Quadric surfaces, two hours.— By Professor W. VOIGT: Mechanics, four hours.— By Dr. M. ABRAHAM: Theory of elasticity, two hours.

UNIVERSITY OF HALLE. — By Professor G. CANTOR: Theory of elliptic functions, four hours; Selected chapters of analytic mechanics, two hours; Seminar, two hours — By Professor A. WANGERIN: Theory of potential and spherical harmonics, four hours; Integral calculus with exercises, four hours; Seminar, two hours. — By Professor A. GUTZMER: Calculus of variations, four hours; Analytic geometry of space, four hours; Axonometry and perspective, two hours. — By Professor V. EBERHARD: Numerical equations and iterated functions, two hours; Theory of numbers, II, two hours; Colloquium, two hours. — By Dr. F. BERNSTEIN: Theory and application of definite integrals, four hours; Mathematics of insurance, one hour.

UNIVERSITY OF JENA. — By Professor F. HAUSSNER: Integral calculus with exercises, five hours; Algebra, four hours; Analytic geometry of space, four hours; Seminar, two hours; Proseminar, two hours. — By Professor J. THOMAE: Differential equations, four hours; Seminar, two hours. — By Professor G. FREGE: Analytic mechanics, four hours; Symbolic methods, one hour. — By Professor R. RAU: Graphical methods in statics and mechanics, three hours.

UNIVERSITY OF LEIPZIG. — By Professor C. NEUMANN: Analytic mechanics, four hours. — By Professor A. MAYER: Calculus of variations, four hours. — By Professor O. HÖLDER: Elliptic functions, four hours; Seminar, two hours. — By Professor K. ROHN: Analytic geometry of space, four hours; Descriptive geometry, two hours; with exercises, two hours. — By Professor F. HAUSDORFF: Calculus, four hours; with exercises, two hours. — By Professor H. LIEBMANN: Theory and application of determinants, two hours; Non-euclidean geometry, two hours.

UNIVERSITY OF MUNICH. — By Professor F. LINDEMANN: Differential calculus, five hours; Theory of abelian functions, four hours; Seminar, one and a half hours. — By Professor A. VOSS: Plane analytic geometry, four hours; Analytic mechanics, I, four hours; Seminar, two hours. — By Professor A. PRINGSHEIM: Theory of infinite series and of similar limiting processes, four hours; Elements of the theory of functions, five hours. — By Professor K. DOEHLEMANN: Descriptive geometry, I, five hours; with exercises, three hours; Synthetic geometry, with exercises, five hours; Lines in art, one hour. — By Professor H. BRUNN; Theory of aggregates, four hours. — By Dr. K. HARTOGS: Integral calculus, six hours. — By Dr. O. PERRON: Elementary geometry and trigonometry, three hours.

UNIVERSITY OF STRASSBURG. — By Professor T. REYE: New methods in the analytic geometry of space, four hours; Mathematical theory of elasticity of rigid bodies, two hours; Seminar, two hours. — By Professor H. WEBER: Calculus, four hours; Differential equations of mathematical physics, two hours; Seminar, hours. — By Professor M. SIMON; Fundamental conceptions of mathematics and mechanics, four hours. — By Professor J. WELLSTEIN: Selected chapters of the theory of functions, four hours; Determinants and matrices, two hours; Seminar, two hours. — By Professor H. E. TIMERDING: Plane analytic geometry, with exercises, four hours; Graphical statics with exercises, two hours; Vector analysis, two hours; Seminar, two hours. — By Dr. S. EPSTEIN: Introduction to higher mathematics for students of natural science, four hours; Seminar, two hours.

AT the University of Göttingen Professor L. PRANDTL has been promoted to a full professorship of mathematics; Professor

M. BRENDEL has been appointed professor of mathematics at the commercial academy of Frankfurt am Main; Dr. O. TOEPLITZ has been appointed docent in mathematics.

PROFESSOR J. DRACH, of the University of Poitiers, has been transferred to a professorship of analysis at the same institution.

DR. M. GROSSMANN, of the University of Basel, has been appointed professor of descriptive geometry at the technical of Zürich, as successor to Professor W. Fiedler, who has retired from active service.

DR. F. HAUSDORFF has been elected an associate member of the academy of sciences at Leipzig.

PROFESSOR J. HORN, of the mining academy at Clausthal, has been appointed professor of mathematics at the technical school of Darmstadt.

DR. L. SCHRUTKA, has been appointed docent in mathematics at the University of Vienna.

PROFESSOR G. HESSENBERG, of the technical school at Charlottenburg, has been appointed professer of mathematics at the agricultural institute at Bonn-Poppelsdorf.

PROFESSOR A. KORN, of the University of Munich, has been elected a member of the academy of sciences at Halle.

DR. M. KUTTA has been promoted to an associate professorship of mathemaics at the technical school of Munich.

PROFESSOR R. D. v. STERNECK, of the University of Czernowitz, has been appointed professor of mathematics at the University of Graz.

DR. R. WEBER, of the University of Heidelberg, has been appointed associate professor of mathematics at the University of Rostock.

DR. G. HERGLOTZ, of the University of Göttingen, has been appointed associate professor of mathematics at the University of Freiburg, Switzerland.

PROFESSOR H. v. MANGOLDT, of the technical school at Danzig, has been decorated with the order of the red eagle of the third class. Professor M. DISTELI, of the technical school at Dresden, has received the title of knight of the cross, of the first class.

THE following promotions to full professorships of mathematics have been made in the French provincial universities: Professor J. CLAIRIN, at the University of Lille; Professor R. LE VAVASSEUR, at the University of Lyons; Professor A. PARAF, at the University of Toulouse.

MR. J. MERCER has been appointed assistant lecturer in mathematics at the University of Liverpool.

AT the University of Illinois the following changes have been made in the mathematical staff: Professor G. A. MILLER has been promoted to a full professorship; Professor E. J. WILCZYNSKI, formerly at the University of California, has been appointed associate professor; Dr. C. H. SISAM was advanced from the grade of instructor to associate; Mr. B. M. MATHEWS has been appointed assistant. As at present constituted the department consists of three professors, one associate professor, three assistant professors, one associate, five instructors, and three assistants.

THE following changes are announced at the University of Missouri: Dr. W. D. A. WESTFALL has been appointed assistant professor of mathematics and granted leave of absence for one year to study in Europe; Dr. OTTO DUNKEL has been appointed instructor; Dr. L. INGOLD returns from his leave of absence; Mr. L. L. SILVERMAN has been appointed acting instructor; Miss A. PAYNE and Miss A. M. LIEPSNER have been appointed assistants; Miss M. S. WALKER has been appointed instructor and granted leave of absence to continue her studies.

PROFESSOR T. F. HOLGATE, of Northwestern University, has been granted leave of absence for the present academic year, and will spend most of the time at Cambridge, England. Professor D. R. CURTISS has been promoted to a full professorship of mathematics.

DR. A. B. PIERCE, of the University of Michigan, has been promoted to an assistant professorship of mathematics.

PROFESSOR O. P. AKERS, of Allegheny College, has been made full professor of mathematics.

DR. J. A. EIESLAND has been promoted to the chair of mathematics at the United States Naval Academy, Annapolis.

DR. W. C. BRENKE has been appointed adjunct professor of mathematics at the University of Nebraska.

PROFESSOR G. D. GABLE, of Parsons College (Iowa), has been appointed professor of mathematics at the University of Wooster, Ohio.

DR. W. H. BUSSEY, of Columbia University, has been appointed assistant professor of mathematics at the University of Minnesota.

PROFESSOR A. L. RHOTON, of the Southwestern University of Tennessee, has been appointed professor of mathematics at Georgetown College, Kentucky.

PROFESSOR R. C. ARCHIBALD, of the Mount Allison Ladies' College, has been appointed professor of mathematics at Acadia University, Wolfsville, N. S.

THE following appointments have been made at the University of Pennsylvania: Dr. F. H. SAFFORD has been promoted to an assistant professorship of mathematics; Messrs. M. J. BABB and L. O'SHAUGHNESSY have been named instructors in mathematics.

DR. R. P. STEPHENS, of Wesleyan University, has been appointed adjunct professor of mathematics at the University of Georgia. Mr. H. B. CAMP has been appointed instructor in mathematics at Wesleyan.

AT Syracuse University, Mr. D. PRATT has been appointed assistant professor of mathematics, and Mr. H. F. HART has been appointed instructor in mathematics.

DR. E. SWIFT has been appointed instructor in mathematics at Princeton University.

MR. R. L. BÖRGER, of the University of Florida, has been appointed instructor in mathematics at the University of Illinois.

MR. G. I. GAVETT, of Cornell University, has been appointed instructor in mathematics at the University of Washington.

MR. A. C. KRATHWOHL has been appointed tutor in mathematics at Barnard College, Columbia University.

MR. C. A. TOUSSAINT, of Columbia University, has been appointed tutor in mathematics at the College of the City of New York.

MR. W. V. LOVITT has been appointed instructor in mathematics at the University of Washington, Seattle, Washington.

MR. W. T. AUDE, of Colgate University, has been appointed instructor in mathematics at the Carnegie Institute in Pittsburgh.

MR. C. H. FORSYTH has been made assistant in mathematics at the University of Illinois.

MISS M. E. SINCLAIR, of the University of Nebraska, has been appointed instructor in mathematics at Oberlin College.

PROFESSOR E. C. COLPITTS, of the Georgia School of Technology, has been appointed professor of mathematics at Emporia College, Kansas.

DR. OREN ROOT, for 27 years professor of mathematics at Hamilton College, died August 26, at the age of 69 years.

NEW PUBLICATIONS.

I. HIGHER MATHEMATICS.

BROGGI (U.). Traité des assurances sur la vie avec développements sur le calcul des probabilités. Paris, Hermann, 1907. 8vo. 11+309 pp.

DINI (U.). Lezioni di analisi infinitesimale. Vol. I. Calcolo differenziale. Pisa, Nistri, 1907. 8vo. 720 pp. L. 22.00

DOLGE (P.). Ueber Bernoullische Zahlen und Funktionen, welche zu einer Fundamentaldiskriminante gehören, und deren Anwendung auf die Summation unendlicher Reihen. (Progr.) Dresden, 1907. 8vo. 44 pp.

EGERER (H.). Ueber die Kurve der Ecken der Vierseite, die von den gemeinsamen Tangenten eines festen Kegelschnitts und der Kegelschnitte eines Büschels gebildet werden. (Diss.) Erlangen, 1906. 8vo. 53 pp.

FACK (M.). Zur didaktischen Darstellung von Stoffen aus der niedern und höheren Mathematik. (Progr.) Weimar, 1907. 8vo. 53 pp.

FAZZARI (G.). Breve storia della matematica dai tempi antichi al medio evo. Palermo, Sandron, 1907. 16mo. 267 pp. L. 4.00

FOETHKE (E.). Anwendung des erweiterten Euklidischen Algorithmus auf Resultantenbildungen. (Diss.) Königsberg, 1907. 8vo. 75 pp.

GILLESPIE (D. C.). Anwendungen des Unabhängigkeitssatzes auf die Lösung der Differentialgleichungen der Variationsrechnung. (Diss.) Göttingen, 1906. 8vo. 75 pp.

GRABER. Zur Zylinder- und Kugelberechnung. (Progr.) Kottbus, 1907. 8vo. 39 pp.