This contains within itself the enunciation of many problems in elementary geodesy. He asks if one should not seek to introduce by elementary methods this geometry into the secondary schools.

C. L. E. MOORE.

NOTES.

THE July number (volume 9, number 3) of the *Transactions* of the AMERICAN MATHEMATICAL SOCIETY contains the following papers : "Brilliant points of curves and surfaces," by W. H. ROEVER ; "Continuous increasing functions of finite and transfinite ordinals," by O. VEBLEN ; "Projective differential geometry of curved surfaces (third memoir)," by E. J. WILCZYNSKI ; "Invariants of the function $F(x, y, x', y')$ in the calculus of variations," by A. L. UNDERHILL ; "The integration of a sequence of functions and its application to iterated integrals," by R. G. D. RICHARDSON.

THE July number (volume 30, number 3) of the *American Journal of Mathematics* contains the following papers : "Determination of conjugate points for discontinuous solutions," by O. BOLZA ; "Mathematical logic as based on the theory of types," by B. RUSSELL ; "Invariantive reduction of quadratic forms in the $GF[2^n]$," by L. E. DICKSON ; "The motion of a particle attracted toward a fixed center by a force varying inversely as the fifth power of the distance," by W. D. MACMILLAN.

THE concluding (July) number of volume 9 of the *Annals of Mathematics* contains the following papers : "On the spherical representation of a surface," by P. SAUREL ; "The absolute minimum in the problem of the surface of revolution of minimum area," by Miss M. E. SINCLAIR ; "Note on the roots of Bessel functions," by C. N. MOORE ; "A smooth closed curve composed of rectilinear segments with vertex points which are nowhere dense," by E. R. HEDRICK ; "Evaluation of the probability integral," by F. GILMAN ; "On a second theorem of the mean," by C. N. HASKINS ; "Another proof of a theorem in multiply perfect members," by R. D. CARMICHAEL ; "A theorem concerning equal ratios," by J. L. COOLIDGE ; "Note on certain iterated and multiple integrals," by W. A. HURWITZ.

THE Italian mathematical society, Mathesis, is being fundamentally reorganized and its activities extended to assist in the reformation of the mathematical studies in the secondary schools of Italy. During the summer numerous local conventions have been held to consider the three questions : 1) scope and purpose of the society ; 2) examination of the report of the commission appointed by the king to reform the secondary schools ; 3) preparation of teachers of mathematics. The next general meeting will be held at Florence, October 17–22, to complete the reorganization. The names of the members of the provisional committee are Professors G. Riboni, of Milan, A. Conti, of Bologna, G. Lazzeri, of Livorno, and F. Severi, of the University of Padua.

THE Belgian academy of sciences announces the following prize subjects for 1909 ; the prize in each case is 800 francs :

Determine, in altitude and azimuth, the expressions for the principal terms of the periodic deviations from the vertical, under the hypothesis of the non-coincidence of the center of gravity of the crust and the center of the earth.

An important contribution to the infinitesimal geometry of ruled euclidean space is desired, with a resumé of the works already published, upon which such contribution is based.

A synopsis of the works upon systems of conics in space, with further investigations in such systems.

Manuscripts should be written in French, Flemish, or Latin, and be submitted to the secretary under the usual conditions before August 1, 1909.

THE academy of sciences of Göttingen makes the following announcement under date of June 27, 1908. According to the will of the late Dr. Paul Wolfskehl, of Darmstadt, a prize of one hundred thousand marks is offered for the proof of the greater Fermat theorem. Fermat asserts that the equation $x^\lambda + y^\lambda = z^\lambda$ cannot be satisfied by whole numbers when λ is any odd prime. The theorem is to be proved, either by Fermat processes or in completion of the investigations of Kummer (*Crelle's Journal*, volume 40, page 130 ; *Abhandlungen der Akademie der Wissenschaften zu Berlin*, 1857). For further literature compare Hilbert, Theorie der algebraischen Zahlkörper, *Jahresbericht der deutschen Mathematiker-Vereinigung*, volume 4 (1894), § 172, and Encyklopädie der Mathematischen Wissenschaften, Band I, Teil 2, Arithmetik

und Algebra (1900–1904), IC 4b, page 713.   The prize will
be awarded under the following conditions :

The academy of sciences of Göttingen will determine to
whom the prize shall be awarded.   It will not consider any
manuscript which is sent to it in competition for the prize, but
will consider all memoirs which appear in the mathematical
periodicals, or which are for sale in the book trade as monographs
or as books.   The academy requests the authors of such memoirs
to send it five printed copies.   Memoirs written in languages
unknown to the judges will not be considered unless accom-
panied by authentic translations.   The academy assumes no
responsibility for the non-consideration of investigations to
which its attention has not been called, or for mistakes that
may arise because the real author of a memoir or part of a
memoir is unknown to the academy.   In case several persons
participate in the actual solution, the academy reserves to itself
the right of determining how the prize shall be divided.   The
award of the prize by the academy will be made not earlier than
two years after the publication of the memoir for which it is
awarded.   During this period opportunity will be given math-
ematicians to express an opinion on the correctness of the solu-
tion selected, which will be made public.   If the prize is
awarded by the academy the successful competitors will be no-
tified by the secretary in the name of the academy, and the action
published throughout the world.   The award can not be con-
tested.   The payment of the prize will be made within three
months after it has been awarded, from the treasury of the Uni-
versity of Göttingen.   Should the securities which are provided
for the prize depreciate in value, the award will be considered
made when they are surrendered to the successful competitor.
These conditions are now in force, but will lapse September 13,
2007, if the prize is not previously awarded.

THE Göttingen academy announces also the following prize
problem for 1909 :

A new exact determination of a specific electron charge and
its variation with varying velocity is desired.   All the pub-
lished results of experiments are to be carefully examined, and
the various electron theories critically examined.   Competing
memoirs should be sent to the secretary before February 1,
1909.   The prize is M. 1000.

THE royal institute of Lombardy announces the following
prize subject for 1908 :

The theory of transformations founded by Lie and developed during the last thirty years has been found useful in the most varied applications to geometry and mathematical analysis. It is desired to extend or complete this theory in some important aspect. Memoirs should be written in Italian, French, or Latin and forwarded to the secretary at Milan, Palazzo di Brera, before December 31, 1908.

THE Berlin academy of sciences has divided the prize of 5000 marks for the analysis of the Leibniz system of philosophy between Dr. W. KABITZ, of Breslau, and Dr. P. RITTER, of Berlin, in recognition of their work on the critical catalogue of Leibniz manuscripts.

THE philosophical faculty of the University of Berlin has awarded the prize for the solution of the problem of determining the newtonian potential of a non-homogeneous polyhedron to H. CLAUSSEN.

THE publishing house of B. G. Teubner in Leipzig dedicated the 101st edition of its catalogue of mathematical and technical books to the fourth international congress of mathematicians held in Rome last April. A portrait of Galileo appropriately appears opposite the title page. Preceding the catalogue proper is an extensive introduction giving the history of the development of the firm, which is almost synchronous with the development of mathematical literature in Germany. Besides the books which have already appeared a large number still in preparation are listed, and the plan for further extension is explained. Added to the catalogue proper is a long list of biographical notices of well known mathematicians, much more elaborate and extensive than the former list. The volume of over 600 pages is itself no small contribution to mathematical literature.

THE following courses in mathematics are announced for the winter semester of 1908–1909.

UNIVERSITY OF BERLIN.— By Professor H. A. SCHWARZ; Differential calculus, four hours : Synthetic geometry, four hours ; Theory of complex numbers, two hours ; Seminar, two hours ; Colloquium, two hours.— By Professor G. FROBENIUS : Algebra, four hours ; Analytic geometry, four hours ; Seminar, two hours. —By Professor F. SCHOTTKY : General theory of functions, four hours ; Theta series, two hours ; Seminar,

two hours.— By Professor G. HETTNER: Theory of the potential, two hours.— By Professor J. KNOBLAUCH: Theory and application of determinants, four hours; Surfaces and space curves, four hours; Proseminar, one hour.— By Professor R. LEHMANN-FILHÉS: General mechanics, four hours.— By Professor E. LANDAU: Integral calculus, four hours; Theory of aggregates, four hours.— By Dr. I. SCHUR: Theory of numbers, four hours; Elliptic functions, four hours.— By Dr. G. VALENTIN: Vector analysis, two hours.

UNIVERSITY OF BONN.— By Professor E. STUDY: Elliptic functions, three hours; Complex geometry, two hours; Seminar, one hour.— By Professor G. KOWALEWSKI: Differential and integral calculus, II, four hours; Fourier's series, two hours; Theory of aggregates, two hours; Seminar, two hours. — By Professor F. LONDON; Analytic geometry, four hours; Descriptive geometry, II, three hours.— By Dr. E. SCHMIDT: Algebra, four hours.— By Dr. C. CARATHÉODORY: Mechanics, two hours.

UNIVERSITY OF GÖTTINGEN.— By Professor F. KLEIN: Mechanics, four hours; Seminar, two hours. —By Professor D. HILBERT: Theory of functions, four hours; Principles of mathematics, two hours; Seminar, two hours. — By Professor H. MINKOWSKI: Algebra, four hours; Theory of probabilities, two hours; Seminar (with Professor Hilbert).— By Professor C. RUNGE: Differential and integral calculus, II. six hours; Seminar, two hours. — By Professor L. PRANDTL: Statics, three hours; Seminar, two hours. — By Professor W. VOIGT: Partial differential equations of mathematical physics, four hours. — By Professor E. ZERMELO: Calculus of variations, four hours. By Professor G. HERGLOTZ: Theory of orbits, two hours. — By Professor F. BERNSTEIN: History of modern mathematics, two hours; Principles of insurance, two hours; Seminar in insurance, two hours. — By Dr. P. KOEBE: Descriptive geometry with exercises, eight hours. — By Dr. O. TOEPLITZ: Theory of groups, two hours.

UNIVERSITY OF LEIPZIG. — By Professor C. NEUMANN: Differential and integral calculus, four hours. — By Professor O. HÖLDER: Mechanics, four hours; Algebra, four hours; Seminar, two hours. — By Professor K. ROHN: Differential geometry of curves and surfaces, four hours; Surfaces of the third order, two hours; Seminar, two hours. — By Professor

F. HAUSDORFF : Series and definite integrals, four hours. — By Professor H. LIEBMANN : Analytic geometry of space, four hours.

UNIVERSITY OF MUNICH. — By Professor F. LINDEMANN : Plane analytic geometry, four hours; Ordinary and partial differential equations, four hours; Foundations of insurance, two hours; Seminar, two hours. — By Professor A. VOSS: Differential calculus, four hours; with exercises, two hours; Differential geometry of curves and surfaces, I, four hours; Seminar, two hours. — By Professor A. PRINGSHEIM : Algebra, four hours; Elliptic functions, four hours. — By Professor A. SOMMERFELD : Theory of electrons, four hours; Theory of the top, two hours. — By Professor K. DOEHLEMANN : Descriptive geometry, with exercises, eight hours; Line geometry, four hours; Artistic perspective, two hours. — By Professor H. BRUNN : Theory of point sets, four hours. — By Dr. G. HARTOGS : Algebraic analysis, four hours. — By Dr. O. PERRON : Theory and application of determinants, four hours; Divergent series, two hours.

UNIVERSITY OF STRASSBURG. — By Professor H. WEBER : Differential and integral calculus, four hours; Theory of elliptic functions, two hours; Seminar, two hours. — By Professor J. WELLSTEIN : Encyclopedia of elementary mathematics, II, three hours; Linear differential equations, two hours; Seminar, one hour. — By Professor E. TIMERDING : Plane analytic geometry, three hours; with exercises, one hour; Descriptive geometry, with exercises, four hours; Spherical trigonometry, one hour. — By Professor M. SIMON : Non-euclidean geometry in elementary treatment, two hours. — By Professor P. EPSTEIN : Introduction to the theory of numbers, two hours.

PROFESSOR E. PICARD, of the University of Paris, has been elected vice-president of the academy of sciences of Paris.

PROFESSOR K. PETR, of the Bohemian University of Prague, has been promoted to a full professorship of mathematics.

PROFESSOR F. PROHAZKA, of the technical school at Brünn, has been appointed professor of geometry at the Bohemian technical school at Prague.

DR. M. FRÉCHET has been appointed master of mathematical conferences at the University of Rennes.

DR. E. ZORETTI has been appointed master of mathematical conferences at the University of Grenoble to succeed Dr. M. DULAC, who has been appointed acting professor of mathematics at the University of Poitiers.

PROFESSOR P. BURGATTI, of the University of Messina, has been appointed associate professor of mechanics at the University of Bologna.

DR. T. BOGGIO, of the University of Turin, has been appointed associate professor of mechanics at the University of Messina.

PROFESSOR G. DEFRANCHIS, of the University of Parma, and Professor M. PIERI, of the University of Catania will exchange chairs.

PROFESSOR F. GERBALDI, of the University of Palermo, has been appointed professor of algebra and analytic geometry at the University of Pavia.

PROFESSOR G. HERGLOTZ, of the University of Göttingen, has been appointed professor of mathematics at the University of Vienna.

DR. P. EPSTEIN, of the University of Strassburg, has been promoted to an associate professorship of mathematics.

PROFESSOR W. SCHLINK, of the technical school at Brunswick, has been promoted to a full professorship of theoretical mechanics.

PROFESSOR A. KNESER, of the University of Breslau, and Professor K. HENSEL, of the University of Marburg, have both declined calls to the vacant professorships of mathematics at the University of Leipzig.

PROFESSOR A. GUTZMER, of the University of Halle, has been decorated with the order of the red eagle of the fourth class.

PROFESSOR F. SCHUR, of the technical school at Karlsruhe, has been appointed professor of mathematics at the University of Strassburg, as successor to Professor TH. REYE, who has retired.

PROFESSOR H. BURKHARDT, of the University of Zürich, has been appointed professor of mathematics at the technical school at Munich, as successor to the late Professor Braunmühl.

PROFESSOR H. LAMB, of the University of Manchester, has received the honorary degree of doctor of laws from Cambridge University.

THE London mathematical society awarded the De Morgan prize for 1908 to Dr. J. W. L. GLAISHER for his researches in pure mathematics.

THE order of knighthood has been conferred upon Professor A. G. GREENHILL, of the ordnance college at Woolwich.

MR. W. F. STANTON has been appointed instructor in mathematics at University College, London.

DR. H. G. KEPPEL, of Northwestern University, has been appointed professor of mathematics at the University of Florida.

AT Indiana University Professors S. C. DAVISSON and D. A. ROTHROCK have been promoted to full professorships of mathematics; Dr. C. HASEMAN has been promoted to an assistant professorship of mathematics.

PROFESSOR J. E. SINCLAIR, of the Worcester Polytechnic Institute, has retired from active service.

MR. J. W. MILLER and Mr. J. E. STOCKER have been promoted to assistant professorships of mathematics at Lehigh University.

THE following changes have taken place at the Massachusetts Institute of Technology: Dr. W. H. ROEVER has been appointed assistant professor of mathematics at Washington University, St. Louis; Mr. J. N. LENNES has been appointed assistant professor of mathematics at Brown University; Dr. C. L. E. MOORE has returned from his leave of absence in Italy and will resume his duties as instructor of mathematics; Mr. E. A. MILLER has retired to enter business; Mr. J. LIPKE, of the University of California, has been appointed instructor in mathematics.

MR. H. H. DALAKER has been appointed assistant professor of mathematics at the University of Minnesota.

MR. E. P. R. DUVAL, of the University of Wisconsin, has been appointed associate professor of mathematics at the University of Oklahoma.

DR. FRANK IRWIN has been appointed instructor in mathematics at Princeton University.

DR. G. M. COLLWELL has been appointed instructor in mathematics at Yale University.

PROFESSOR C. E. BIKLÉ, of Teachers College, Columbia University, has resigned to accept a position in the public schools at Syracuse, N. Y.

MR. A. B. FRIZELL, of Harvard University, has been appointed professor of mathematics and astronomy in Midland College, Atchison, Kansas.

PROFESSOR F. W. HANAWALT, of Albion College, has been appointed professor of mathematics and astronomy at the University of Puget Sound.

PROFESSOR FLOYD FIELD, of the Georgia School of Technology, has been appointed acting head of the department of mathematics in the absence of Professor O. T. GECKELER, who will spend the coming year in study at the University of Pennsylvania.

THE death is announced of ISRAEL C. PIERSON, for thirty-five years actuary of the Washington Life Insurance Company of New York. Mr. Pierson had been a member of the AMERICAN MATHEMATICAL SOCIETY since 1889.

PROFESSOR H. JOLY, of the University of Lausanne, died August 4, at the age of 48 years.

DR. CHARLES TAYLOR, Master of St. John's College, Cambridge, died August 12, 1908, at the age of 43 years.

NEW PUBLICATIONS.

I. HIGHER MATHEMATICS.

ALCAYDE (N.). Cálculo de probabilidades. Obra declarada de texto para la Academia de ingenieros del ejército por real orden de 23 de Octubre de 1907. Guadalajara, Colegio de Huérfanos de la Guerra, 1908. 8vo. 79 pp.

BOLZA (O.). Vorlesungen über Variationsrechnung. Umgearbeitete und stark vermehrte deutsche Ausgabe der "Lectures on the calculus of variations." In drei Lieferungen. Lieferung I. Leipzig, Teubner, 1908. 8vo. 4 + 300 pp. M. 8.00

BURKHARDT (H.). Entwicklungen nach oscillirenden Functionen und Integration der Differentialgleichungen der mathematischen Physik. Bericht, erstattet der deutschen Mathematiker-Vereinigung. (In zwei Halbbänden.) Leipzig, Teubner, 1908. 8vo. 12 + 3 + 1804 pp. M. 30.00