

instrumentality of algebraic continued fractions leading to a somewhat full and independent discussion of the theory of such fractions.

A few typographical errors have been observed, none of which would be confusing to the reader. The formulas in x , pages 33–34, should, of course, be expressed in terms of z . The word *sixth*, page 29, line 20, is apparently incorrect, as Humbert states explicitly (*Liouville*, 1893, page 436) that the minimum degree of hyperelliptic surfaces is not yet determined, but he believes it to be *eight*, and considers a number of cases of surfaces of that degree (pages 436–449).

The book is unfortunately printed on very thick paper; while not bulky, it could have been made into a more tasty and compact volume of less than half the thickness.

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CORNELL UNIVERSITY.

CORRECTION.

The following correction should be made in the paper by Mr. Lennes in the October BULLETIN: Page 14, lines 14–16, *for* where M is the difference . . . of $f(x)$ on ab *read* where M is twice the least upper bound of the absolute value of $f(x)$ on ab .

NOTES.

By arrangement with The Macmillan Company a limited number of copies of the Chicago Congress Mathematical Papers are offered to members of the AMERICAN MATHEMATICAL SOCIETY at \$1.50 per volume, one half the former price. Orders should be sent direct to the Macmillan Company or to the Secretary of the Society, no commission being allowed to agents. Details concerning the book will be found in the advertising pages of the BULLETIN.

THE seventy-sixth annual meeting of the British association for the advancement of science was held at York, England, August 3 to 8. Professor R. LANKESTER was president of the association, and Dr. E. H. GRIFFITHS president of section A,

mathematics and physics. The papers of mathematical interest were: "On the notation and use of vectors," by Professor O. Henrici; "On the irregular motion of the earth's pole," by Mr. E. H. Hills and Professor J. Larmor; "Expansions in products of oscillatory functions," by Professor A. C. Dixon; "On the motion of a particle in a cyclone," by Professor W. H. H. Hudson; "On hypereven numbers," by Lt. Col. A. Cunningham; "On the Lagrange equation," by Professor A. R. Forsyth; "Two new symmetric functions," by Major P. A. MacMahon; "Finite groups," by Mr. H. Hilton; "On multiple series," by Professor T. J. P. A. Bromwich; "Many valued functions of real variables," by Mr. A. R. Richardson; "On methods of computing Bessel functions for large values of the argument," by Professor A. Lodge. The next meeting is to be held at Leicester, that of 1908 at Dublin, and in 1909 the association will for the third time visit Canada, the meeting to be held in Winnipeg.

THE Royal Belgian academy of sciences announces the following prize problems in astronomy and mathematics for the year 1907 (each prize is 800 francs):

(1) To find, in altitude and azimuth, the expressions of the principal terms of the periodic deviations of the vertical, under the hypothesis of the non-coincidence of the centers of gravity of the crust and core of the earth.

(2) Between the elements of two forms of the second order (two non-superposed plane systems, or a plane and a bundle, or two bundles with different vertices) a quadratic correspondence is established (in the sense of Reye, *Geometrie der Lage*, volume 2, chapter 22). It is desired to study the system of elements obtained by joining or by intersection of pairs of homologous elements in the two forms of the second order.

THE foreign universities below offer courses in mathematics during the year 1906-1907 as follows:

CAMBRIDGE UNIVERSITY. — *Michaelmas term*, 1906. — By Professor A. R. FORSYTH: Abel's theorem and abelian functions, three hours. — By Professor Sir G. H. DARWIN: Theory of potential and attractions, three hours. — By Professor Sir R. S. BALL: Spherical astronomy, three hours. — By Professor J. LARMOR: Electricity and magnetism, three hours. — By Professor B. HOPKINSON: Applied mathematics, two hours. — By

Dr. E. W. HOBSON: Representation of functions by series, three hours.—By Dr. H. F. BAKER: Theory of functions, three hours; By Mr. H. W. RICHMOND: Analytic geometry, three hours.—By Dr. A. N. WHITEHEAD: Principles of mathematics, three hours.—By Mr. A. BERRY: Elliptic functions, Bessel functions and Fourier series, three hours.—By Mr. A. MUNRO: Hydrodynamics and sound, I, three hours.—By Mr. J. H. GRACE: Invariants and geometric applications, three hours.—By Mr. E. W. BARNES: Taylor's series, three hours.

Lent term, 1907.—By Professor A. R. FORSYTH: Calculus of variations, three hours.—By Professor Sir G. H. DARWIN: Figure of the earth and precession, three hours.—By Professor Sir R. S. BALL: Spherical astronomy, II, three hours.—By Professor J. LARMOR: Electrodynamics, three hours.—By Professor B. HOPKINSON: Applied mathematics, two hours.—By Dr. E. W. HOBSON: Vibrations and sound, three hours.—By Dr. H. F. BAKER: Theory of continuous groups, three hours.—By Mr. H. W. RICHMOND: Analytic geometry, II, three hours.—By Mr. A. N. WHITEHEAD: Principles of mathematics, II, three hours.—By Mr. B. A. HERMAN: Hydro-mechanics, I, three hours; Hydrodynamics, three hours.—By Mr. C. T. BENNETT: Line geometry, three hours.—By Mr. E. W. BARNES: Linear differential equations, three hours.

Easter term, 1907.—By Professor J. LARMOR: Theory of gases and thermodynamics, two hours.—By Mr. H. W. RICHMOND: Projective geometry, three hours.—By Mr. A. N. WHITEHEAD: Noneuclidean geometry, three hours.—By Mr. A. YOUNG: Theory of invariants, three hours.—By Mr. G. H. HARDY: Integral functions, three hours.—By Mr. R. R. WEBB: Definite integrals, three hours.

UNIVERSITY OF BERLIN (winter semester.)—By Professor H. A. SCHWARZ: Differential calculus, four hours; synthetic geometry, four hours; Geometric conics, two hours; Seminar, two hours; Colloquium, two hours.—By Professor G. FROBENIUS: Algebra, four hours; Seminar, two hours.—By Professor F. SCHOTTKY: Integral calculus, four hours; General theory of functions, four hours; Seminar, two hours.—By Professor G. HETTNER: Definite integrals, two hours.—By Professor J. KNOBLAUCH: Determinants, four hours; Curved surfaces, four hours; Twisted curves, one hour.—By Pro-

fessor R. LEHMANN-FILHÉS : Analytic geometry, four hours. By Professor E. LANDAU : Theory of numbers, four hours. — By Dr. I. SCHUR : Ordinary differential equations, four hours.

UNIVERSITY OF BONN (winter semester.) — By Professor E. STUDY : Non-euclidean geometry, four hours ; Introduction to analytic mechanics, four hours ; Seminar, two hours. — By Professor G. KOWALEWSKI : Calculus, II, four hours ; Fourier's series, two hours ; Geometry of numbers, two hours ; Seminar, two hours. — By Professor F. LONDON : Analytic geometry of two and three dimensions, four hours ; Descriptive geometry with exercises, three hours ; Seminar, two hours. — By Dr. E. SCHMIDT : Introduction to algebra, three hours ; Determinants, two hours.

UNIVERSITY OF BOLOGNA. — By Professor C. ARZELÀ : Elements of differential geometry, differential equations and calculus of variations, three hours. — By Professor E. CESÀRO : Mathematical theory of elasticity, three hours. — By Professor L. DONATI : General methods of mathematical physics, Lorentz's theory of electrons, three hours. — By Professor L. PINCHERLE : Elements of algebraic functions and integrals, three hours ; Continuous groups of transformations, three hours.

UNIVERSITY OF CATANIA. — By Professor G. LAURICELLA : Functional equations of potential and electrostatics, four and a half hours. — By Professor G. PENNACCHIETTI : Dynamics of solid bodies, II, four and a half hours. — By Professor M. PIERI : Selected chapters of differential geometry, three hours. — By Professor C. SEVERINI : Groups of substitutions and the Galois theory of algebraic equations, three hours.

UNIVERSITY OF GENOA. — By Professor G. FUBINI : Differential and integral equations, developments in series of normal functions, three hours. — By Professor G. LORIA : General theory of algebraic curves and surfaces, three hours. — By Professor O. TEDONE : Vector analysis, kinematics and statics of continua, three hours.

UNIVERSITY OF MESSINA. — By Professor G. BAGNERA : Algebraic functions of two variables, and their integrals, three hours. — By Professor R. MARCOLONGO : Electrodynamics, Lorentz's theory and its applications to optics, three hours. — By Professor V. MARTINETTI : General theory of plane curves, cubic curves, three hours. — By Professor S. ORLANDO : Par-

tial differential equations of mathematical physics, three hours. — By Professor G. VIVANTI: Applications of the theory of contact transformations, three hours.

UNIVERSITY OF NAPLES. — By Professor F. AMODEO: History of mathematics from 1200 to 1800, four and a half hours. — By Professor A. CAPELLI: Theory of groups and applications to analysis, four and a half hours. — By Professor P. DEL PEZZO: The non-euclidean geometries, four and a half hours. — By Professor A. DEL RE: Algebra of logic, four and a half hours. — By Professor D. MONTESANO: Hypergeometry, four and a half hours; Imaginary elements of geometry, four and a half hours. — By Professor L. PINTO: Electrostatics, three hours. — By Professor F. SIACCI: General theory of dynamical equations, three hours.

UNIVERSITY OF PADUA. — By Professor F. D'ARCAIS: Theory of analytic functions; assemblages and applications, four and a half hours. — By Professor A. FAVARO: History of mathematics in Italy to the sixteenth century, three hours. — By Professor P. GAZZANIGA: Theory of numbers, three hours. — By Professor T. LEVI-CIVITA: Electromagnetic fields, dynamics of electrons, four and a half hours. — By Professor A. PADOA: Mathematical logic, one hour. — By Professor G. RICCI: Mathematical physics, elasticity and application to optics, four hours. — By Professor F. SEVERI: Theory of algebraic functions of one and two variables with geometric applications, four hours. — By Professor G. VERONESE: Geometry of hyperspace, four hours.

UNIVERSITY OF PALERMO. — By Professor F. GERBALDI: Theory of functions and applications, three hours. — By Professor G. B. GUCCIA: Theory of plane curves and surfaces, four and a half hours. — By Professor G. TORELLI: Partial differential equations of mathematical physics, four and a half hours. — By Professor A. VENTURI: Theory of the form of the earth, theory of the tides, four and a half hours.

UNIVERSITY OF PAVIA. — By Professor E. ALMANZI: Mathematical theory of elasticity, three hours. — By Professor F. ASCHIERI: Projective properties of algebraic forms in hyperspace, with applications, three hours. — By Professor L. BERZOLARI: General theory of functions, elliptic functions, three hours. — By Professor E. PASCAL: Theory of transformations of elliptic functions, with application to the quintic

equation; Differential forms of order higher than two, three hours.

UNIVERSITY OF PISA.—By Professor E. BERTINI: Foundations of the geometry of hyperspaces, geometry of general algebraic curves, two hours.—By Professor L. BIANCHI: Theory of functions and elliptic functions, four and a half hours.—By Professor U. DINI: Linear differential equations, four and a half hours.—By Professor A. MAGGI: Principles of electricity, four and a half hours.—By Professor P. PIZZETTI: General notions of spherical astronomy and planetary perturbations, three hours.

UNIVERSITY OF ROME.—By Professor G. BISCONCINI: Mathematical theory of elasticity, with applications, three hours.—By Professor G. CASTELNUOVO: Cremona transformations and linear systems of curves, three hours.—By Professor V. CERRUTI: Calculus of variations, three hours.

UNIVERSITY OF TURIN.—By Professor G. MORERA: Hydrodynamics, three hours.—By Professor E. D'OVIDIO: Theory of functions, Jacobi's and Weierstrass's theories of elliptic functions, three hours.—By Professor G. PEANO: Mathematical logic, two hours.—By Professor C. SEGRE: Groups in geometry, three hours.—By Professor C. SOMIGLIANA: Mathematical theory of elasticity and its applications, three hours.

PROFESSOR E. CESÀRO, of the University of Naples, has been appointed professor of analytic mechanics at the University of Bologna.

At the University of Naples, Professor P. DEL PEZZO (higher and differential geometry) and Professor D. MONTE-SANO (projective and synthetic geometry) have exchanged chairs.

PROFESSORS L. BIANCHI and P. PIZZETTI, of the University of Pisa, and Professor C. SEGRE, of the University of Turin, have been elected members of the Royal institute of Venice.

PROFESSOR F. ENRIQUES, of the University of Bologna, has been elected corresponding member of the Royal academy of the Lincei. Professor P. PAINLEVÉ, of the University of Paris, has been elected foreign member.

THE University of Aberdeen has conferred the honorary degree of doctor of science on Professor G. VERONESE, of the University of Padua.

DR. M. ADLER has been appointed docent in descriptive geometry at the technical school of Vienna, and Dr. K. BOPP to a similar position at the University of Heidelberg.

PROFESSOR P. STÄCKEL, of the technical school at Hanover, has been elected corresponding member of the Royal society of Göttingen.

ON account of his duties connected with the reorganization of the technical school at Turin, Professor V. VOLTERRA, of the University of Rome, has been relieved from lecturing during the present year.

PROFESSOR A. SOMMERFELD, of the technical school at Aachen, has been appointed professor of theoretical physics at the University of Munich.

PROFESSOR G. B. HALSTED, recently of Kenyon College, Ohio, has been appointed professor of mathematics at the Colorado State normal school, Greeley, Colorado.

AT the University of Missouri, Dr. L. D. AMES has been promoted to an assistant professorship of mathematics.

DR. H. A. CONVERSE, recently of the Baltimore Polytechnic Institute, has been appointed professor of mathematics in Davis and Elkins College, Elkins, W. Va.

MR. C. G. SIMPSON has been appointed instructor in mathematics in the State University of Iowa.

DR. C. H. SISAM, of the U. S. Naval Academy, has been appointed instructor in mathematics at the University of Illinois.

MISS M. H. WALBRIDGE has been appointed professor of physics and mathematics at Wells College, Aurora, New York.

DR. A. L. P. WERNICKE, formerly professor of modern languages in the State College of Kentucky, has been appointed instructor in mathematics in Washington University, St. Louis.

PROFESSOR LUDWIG BOLTZMANN, professor of theoretical physics at the University of Vienna, died by his own hand, September 5, at the age of 62 years.

Catalogues of second-hand mathematical works: Alfred Lorenz, Leipzig, Kurprinzstrasse 10, Katalog 165, logic (logic of mathematics; arithmetic, geometric and infinitesimal methods etc.).—Franz Pietzker, Tübingen, Verzeichnis No. 366, mathematics, physics and astronomy.—Galloway and Porter, Cam-

bridge, England, catalogue No. 30, containing 466 titles in mathematics. — Max Weg, Leipzig, Leplaystrasse 1, catalogue No. 103, geodesy, astronomy, mathematics and physics, 2682 titles. — Gustav Fock, Leipzig, Schlossgasse 7–9, Antiquariats-Verzeichnis, No. 288, 4400 titles in mathematics and physics, including the library of the late Professor O. Stolz.

NEW PUBLICATIONS.

I. HIGHER MATHEMATICS.

- ANDRADE (J.). Les fonctions angulaires dans la géométrie de l'ajustage. 8vo. (*L'enseignement mathématique* 8, pp. 257–281.)
- BARTOLI (E.). See FREYCINET (C. DE).
- BERZOLARI (L.). See ENCYKLOPÄDIE.
- BRIOSCHI (F.). Opere matematiche, pubblicate per cura del comitato per le onoranze a Francesco Brioschi. Vol. IV. Milano, Hoepli, 1906. 4to. 8 + 418 pp.
- ENCYKLOPÄDIE der mathematischen Wissenschaften mit Einschluss ihrer Anwendungen. Herausgegeben im Auftrage der Akademien der Wissenschaften zu Göttingen, Leipzig, München und Wien sowie unter Mitwirkung zahlreicher Fachgenossen. (In 7 Bänden.) Vol. III: Geometrie, redigiert von W. F. Meyer. Teil 2, Heft 3: H. G. Zeuthen, Abzählende Methoden; L. Berzolari, Allgemeine Theorie der höheren ebenen algebraischen Kurven. Leipzig, Teubner, 1906. 8vo. Pp. 257–455.
- FREYCINET (C. DE). Saggio sulla filosofia delle scienze. Analisi; meccanica. Traduzione da E. Bartoli. Bari, 1906. 12mo. 330 pp. M. 3.00
- GRÜNFELD (E.). Zur Theorie der linearen Differentialgleichungen. (Progr.) Wien, 1906. 8vo. 20 pp.
- GRUNER (P.). Tabellen für die Exponentialfunktion mit negativen Exponenten. Leipzig, Hirzel, 1906. 8vo. 15 pp. M. 1.00
- HISSL (M.). Einige Elemente der vierdimensionalen Geometrie. (Progr.) Stockerau, 1906. 8vo. 22 pp.
- HOLTAPPEL (W. T.). See SCHOUTEN (G.).
- MEYER (W. F.). See ENCYKLOPÄDIE.
- MIRINNY (L.). Isonolyse (résolution générale des équations). Méthode primordiale. Pentisonolyse (résolution générale de l'équation du cinquième degré). (I. Algébrique proprement dite ou par radicaux; II. Exponentielle; III. Trigonométrie; IV. Géométrie; V. Tropo-nomique.) Aperçu sommaire initial. Edition de 1896 élucidée et abrégée. Paris, Marquet, 1906. 16mo. 4 pp., 3 plates.
- MOSNAT (E.). Problèmes de géométrie analytique. Vol. I: A l'usage des candidats aux écoles (centrale, ponts et chaussées, mines, polytechnique, normale) et des aspirantes à l'agrégation des jeunes filles. 3e édition. Paris, Vuibert et Nony [1906]. 8vo. 528 pp.