

## ERRATA.

THE following errata in the current volume of the BULLETIN have been brought to the notice of the editors :

Page 66, line 4, for  $(x_4, y_5, z_{26})$  read  $(x_4, x_5, z_{26})$ ; line 20, second sum, for  $x_{\lambda\rho}$  read  $y_{\lambda\rho}$ .

Page 68, line 15, for  $y_{ii}$  read  $y_{ij}$ .

Page 69, line 32, for  $(j = 1, \dots, 6)$  read  $(j, k = 1, \dots, 6)$ .

Page 263. In the announcement of the prize question of the Belgian academy of sciences, the last line of the page should read :  $n$ -linear forms,  $n > 3$ .

## NOTES.

THE Librarian of the AMERICAN MATHEMATICAL SOCIETY acknowledges the gift to the library of twenty-one volumes of mathematical works presented by Messrs. Ginn & Co., eight by The Macmillan Company, three by Allyn and Bacon, five by the Open Court Publishing Company, two by Crane & Co. and fourteen by D. C. Heath & Co. Several members of the Society have also responded to the invitation to contribute their publications to the Society's library. The detailed list of bound volumes presented will appear in the Librarian's annual report.

THE second (April) number of Volume III. of the *Transactions* of the AMERICAN MATHEMATICAL SOCIETY contains the following papers : "On the small divisors in the lunar theory," by E. W. BROWN ; "On the holomorphisms of a group," by J. W. YOUNG ; "A simple non-desarguesian plane geometry," by F. R. MOULTON ; "On the real solutions of two linear homogeneous differential equations of the first order," by M. BÔCHER ; "On a recent method for dealing with the intersections of plane curves," by C. A. SCOTT ; "A complete set of postulates for the theory of absolute continuous magnitude," by E. V. HUNTINGTON ; "Complete sets of postulates for the theories of positive integral and of positive rational numbers," by E. V. HUNTINGTON.

AT the meeting of the London mathematical society on March 13th, papers were read by Mr. G. H. HARDY on "The theory of Cauchy's principal values (III)," and by Rev. J. CULLEN on "The solutions of a system of linear congruences."

At the meeting of the Cambridge philosophical society on February 17th, Mr. G. H. HARDY read a paper on "The differentiation and integration of divergent series."

THE members of the AMERICAN MATHEMATICAL SOCIETY residing on the Pacific slope are arranging to hold a meeting early in May for the presentation and discussion of mathematical papers. Application has been made to the Council for the authorization of a Pacific Section.

THE seventy-second annual meeting of the British association for the advancement of science will be held at Belfast, September 10-17. Section A (mathematical and physical science) will be presided over by Professor J. PURSER, and Section G (engineering) by Professor J. PERRY, F.R.S.

IN connection with the publication of the complete works and correspondence of Christian Huyghens, Professor D. J. KORTEWEG, of Amsterdam, desires to examine a Latin pamphlet written about 1692 by a certain Hubertus Huyghens (Huigens or Hugenius), entitled: *Animadversiones quaedam circa proportionem quam ad rectilineas habent figuræ curvilineæ*. The pamphlet is needed to explain certain obscure references in the correspondence between Christian and Hubertus Huyghens, and cannot be found in the European libraries. If any reader of this note knows of the existence of the pamphlet in America, he will confer a favor by communicating the fact to the Librarian of this Society.

PROFESSOR LEO KÖNIGSBERGER, of the University of Heidelberg, has in preparation a biography of Professor Hermann von Helmholtz, which will shortly appear.

CAMBRIDGE UNIVERSITY.—The Smith's prizes for 1902 have been awarded to T. H. HAVELOCK for his essay "On the distribution of energy in the continuous spectrum," and to J. E. WRIGHT for his essay on "Singular solutions of differential equations with known infinitesimal transformations." H. E. WIMPERIS received a mention for his essay on "The temperature of meteorites."

OXFORD UNIVERSITY.—The following mathematical lectures are announced for the Easter and Trinity terms, 1902:—By Professor A. E. H. LOVE: Waves and sound, three hours.—By Professor E. B. ELLIOTT: Elements of the theory of functions, three hours.—By Professor W. ESSON: Synthetic geometry of conics, one hour; Informal instruction, one hour.—By Mr. J. E. CAMPBELL: Some con-

tact transformations, one hour.—By Mr. A. L. DIXON: Calculus of variations, one hour.—By Mr. H. T. GERANS: Line geometry, two hours.—Mr. A. E. JOLLIFFE: Higher analytical plane geometry, two hours; Series, one hour.—By Mr. P. J. KIRKBY: Higher plane curves, two hours.—By Mr. E. H. HAYES: Attractions, two hours.—By Mr. J. W. RUSSELL: An elementary course of rigid dynamics, three hours.—By Mr. C. LEUDESORF: Determinants, two hours first half of term.—By Mr. A. L. PEDDER: Spherical trigonometry, one hour.—By Mr. C. E. HASELFOOT: Theory of equations, one hour.—By Mr. R. F. MCNEILE: Elementary integral calculus, two hours.—By Mr. C. H. THOMPSON: Differential equations, two hours.

UNIVERSITY OF CALIFORNIA.—The following courses in mathematics, mathematical physics and astronomy are announced for the academic year 1902–1903:—By Professor I. STRINGHAM: Analytic projective geometry, three hours; Logic of mathematics, two hours, first semester; History of mathematics, three hours, second semester; seminar, two hours.—By Professor G. C. EDWARDS: Differential equations, three hours; Theory of equations, two hours.—By Dr. E. J. WILCZYNSKI: Linear differential equations, three hours; Analytic geometry of space, three hours, second semester.—By Mr. A. W. WHITNEY: Theory of probabilities, two hours, first semester; Theory of functions of a complex variable, three hours, first semester.—By Dr. C. A. NOBLE: Advanced calculus, three hours; Elliptic functions, three hours, second semester.—By Dr. D. N. LEHMER: Synthetic geometry, three hours, second semester.—By Dr. E. M. BLAKE: Differential geometry, three hours.—By Dr. T. M. PUTNAM: Theory of groups, three hours, first semester.—By Professor KOWER: Descriptive geometry, six hours; Graphostatics, two hours, first semester.—By Professor F. SLATE: Analytic mechanics, four hours; Dynamics of rotation, two hours, second semester.—By Professor RAYMOND: Harmonic motion, two hours, second semester.—By Professor HESSE: Hydrodynamics, three hours, first semester.—By Mr. LECONTE: Kinematics, two hours.—By Mr. ———: Theory of light, two hours.—By Dr. BURGESS: Energetics, two hours, first semester.—By Professor LEUSCHNER: Theoretical astronomy, two hours; Perturbations and celestial mechanics, four hours.—By Dr. TOWNLEY: Advanced practical astronomy, three hours, first semester; Measurement and reduction of astronomical photographs and spectrograms, two hours, first semester; Mechanical quadratures, three hours, second semester.

During the summer session, June 26–August 6, 1902, Dr. E. J. WILCZYNSKI will give a course on the theory of functions, five hours per week.

UNIVERSITY OF MICHIGAN.—The following courses in mathematics are announced for the academic year 1902–1903 :—By Professor W. W. BEMAN : Solid analytic geometry, two hours, first semester ; Differential equations, three hours, first semester ; Advanced differential and integral calculus, two hours ; Higher plane curves, two hours, second semester ; Linear differential equations, two hours, second semester ; Quaternions, two hours, second semester.—By Professor A. ZIWET : Advanced mechanics, three hours, second semester ; Theory of the potential, three hours, first semester.—By Professor J. L. MARKLEY : Projective geometry and modern analytic geometry, three hours ; Theory of functions, three hours.—By Dr. J. W. GLOVER : Higher algebra, three hours ; Theory of substitutions, two hours.—By Mr. E. B. ESCOTT : Theory of numbers, two hours, second semester.

STANFORD UNIVERSITY.—The following courses in pure mathematics are announced for the academic year 1902–1903 :—By Professor R. E. ALLARDICE : Definite integrals, two hours ; Invariants, two hours ; Geometry of three dimensions, three hours.—By Professor R. L. GREEN : Theory of equations, three hours.—By Professor H. F. BLICHFELDT : Non-euclidean geometry, two hours.—By Professor G. A. MILLER : Theory of groups, three hours ; Theory of numbers, two hours ; Seminary in the theory of groups, two hours.

YALE UNIVERSITY.—The following mathematical courses are offered next year :—By Professor J. W. GIBBS : Elementary vector analysis (first semester) ; Advanced vector analysis (second semester), three hours ; Multiple algebra, two hours ; Electromagnetic theory of light, two hours.—By Professor W. A. BEEBE : Elementary analytical mechanics (first semester) ; Celestial mechanics (second semester), three hours.—By Professor JAMES PIERPONT : Advanced calculus, three hours ; Projective geometry, three hours ; Advanced theory of functions of a complex variable, three hours.—By Professor P. F. SMITH : Advanced analytical geometry, two hours, first semester, and three hours, second semester ; Differential equations, two hours (first semester).—By Professor H. A. BUMSTEAD : Problems in mathematical physics, two hours.—By Professor M. B. PORTER : Differential equations and theory of functions (first semes-

ter), and Invariants (second semester) three hours.—By Dr. H. E. HAWKES: Higher algebra, three hours; Complex multiplication of elliptic functions (second semester), three hours.—By Dr. W. A. GRANVILLE: Advanced analytic mechanics, two hours.—By Dr. E. R. HEDRICK: Partial differential equations, three hours.—By Dr. A. S. GALE: Elementary analytic geometry (second course), three hours; Theory of transformations of space (first semester), three hours.

THE several universities below offer during the summer semester of the current academic year courses in mathematics as follows :

UNIVERSITY OF BRESLAU.—By Professor J. ROSANES: Seminary exercises in definite integrals, two hours; Plane analytic geometry, four hours; Modern methods in analytic geometry, two hours.—By Professor R. STURM: Seminary exercises, two hours; Geometrical chapters of mechanics, three hours; Elements of line geometry, three hours.—By Dr. F. LONDON: Theory of elliptic functions, four hours.

UNIVERSITY OF ERLANGEN.—By Professor P. GORDAN: Differential equations, four hours; Algebra, four hours; Seminar, three hours.—By Professor M. NÖTHER: Synthetic geometry with exercises, three hours; Differential geometry of curves and surfaces, three hours; Introduction to elliptic functions, three hours.

UNIVERSITY OF GIESSEN.—By Professor M. PASCH: Algebra, four hours; Selected chapters of analytic geometry, four hours; Seminar, one hour.—By Professor E. NETTO: Plane analytic geometry, four hours; Elliptic functions, four hours; Seminar, one hour.—By Professor R. HAUSSNER: Integral calculus, three hours; Theory of probability, two hours; Descriptive geometry, five hours.

UNIVERSITY OF GÖTTINGEN.—By Professor F. KLEIN: Higher mechanics, four hours; Seminar, two hours.—By Professor D. HILBERT: Differential and integral calculus, four hours; Foundations of geometry, two hours; Selected chapters of the theory of potential, two hours; Seminar in the theory of functions, two hours.—By Professor M. BRENDEL: Selected chapters of higher analysis, three hours, with exercises, two hours; Gylden's theory of perturbations, three hours.—By Professor F. SCHILLING: Analytic geometry, four hours; Perspective, one hour, with exercises,

two hours ; Seminar, exercises in geometry, one hour.—By Professor K. BOHLMANN : Social insurance, two hours, with seminar exercises, two hours.—By Dr. E. ZERMELO : Calculus of variations, two hours ; Exercises in differential and integral calculus, two hours ; Exercises in higher analysis, two hours.—By Dr. O. BLUMENTHAL : Galois's theory of algebraic equations, three hours.

UNIVERSITY OF GREIFSWALD.—By Professor W. THOMÉ : Elliptic functions, II, four hours ; Selected chapters in the theory of analytic functions, one hour ; Seminar, one hour.—By Professor E. STUDY : Mechanics I, four hours ; Selected chapters in the theory of differential equations, two hours ; Seminar.—By Professor G. KOWALEWSKI : Integral calculus, four hours, with exercises, one hour ; Introduction to differential geometry, two hours ; Repetitorium of analytic geometry, two hours.

UNIVERSITY OF HEIDELBERG.—By Professor L. KÖNIGSBERGER : Differential and integral calculus, four hours ; Theory of curves and surfaces, four hours ; Seminar, two hours.—By Professor M. CANTOR : Plane analytic geometry, four hours ; Arithmetic and algebra, three hours.—By Professor F. EISENLOHR ; Theory of probability, three hours ; Mechanics, four hours.—By Professor K. KOEHLER : Plane synthetic geometry, three hours.—By Professor G. LANDSBERG : Theory of determinants, two hours ; Theory of numbers, two hours.—By Dr. K. BOEHM : Selected chapters of higher mechanics, one hour.

UNIVERSITY OF JENA.—By Professor J. THOMÆ : Elliptic functions, four hours, with applications, one hour ; Projective geometry, two hours.—By Professor A. GUTZMER : Plane analytic geometry, four hours ; Calculus of variations, three hours ; Historical development of analysis, one hour.—By Professor G. FREGE : Differential and integral calculus with exercises, five hours.

UNIVERSITY OF MARBURG.—By Professor F. SCHOTTKY : Theory of curved lines and surfaces, four hours ; General theory of functions, four hours ; Seminar, two hours.—By Professor E. HESS : Differential calculus, five hours ; Selected chapters of geometry, three hours ; Seminar, three hours.—By Dr. F. v. DALGWICK : Theory of conics, four hours.

UNIVERSITY OF STRASSBURG.—By Professor T. REYE : Introduction to synthetic geometry, two hours ; Technical

mechanics, four hours ; Seminar, two hours.—By Professor H. WEBER : Calculus of variations, four hours ; Encyclopædia of elementary mathematics, two hours ; Seminar, two hours.—By Professor F. ROTH : Differential and integral calculus, three hours, with exercises ; Plane analytic geometry, three hours.—By Professor A. KRAZER : Definite integrals, three hours ; Introduction to the theory of functions, three hours ; Determinants, two hours ; Seminar, one hour.—By Dr. E. TIMERDING : Theory of tides, two hours.—By Dr. J. WELLSTEIN : Selected chapters of applied mathematics, two hours ; Arithmetic theory of algebraic functions, two hours.

UNIVERSITY OF TÜBINGEN.—By Professor A. v. BRILL : Analytic mechanics, five hours ; Selected chapters of the theory of curves and surfaces, two hours ; Seminar, two hours.—By Professor H. STAHL : Elementary analysis, three hours ; Theory of functions, three hours ; Seminar, two hours.—By Professor L. MAURER : Higher analysis, four hours, with exercises, two hours ; Invariant theory of binary forms, two hours.

THE following noteworthy catalogues of mathematical books have recently appeared : *Lagerverzeichniss 201 der Buchhandlung Gustav Fock, Schlossgasse 7, Leipzig* ; 1096 numbers.—H. WELTER, 4 Rue Bernard-Palissy, Paris, catalogue no. 112 ; 282 numbers on algebra and trigonometry, 215 sets of journals.

PROFESSOR RICHARD DEDEKIND celebrated on March 18 the fiftieth anniversary of his doctorate. On this occasion, the University of Strassburg conferred upon him an honorary doctor's degree, and a congratulatory address was presented by the Deutsche Mathematiker-Vereinigung. In accordance with a German custom, his doctor's diploma was renewed by the University of Göttingen. Professor Dedekind has been connected with the Technical high school at Brunswick since 1862, and still delivers lectures, although he has been nominally retired for some years.

AT Yale University the following changes have taken place in the mathematical faculty : Dr. M. B. PORTER has been promoted from the position of instructor to that of assistant professor. Dr. H. E. HAWKES, who has been studying in Göttingen during the past year, has recently recovered from a severe illness and will resume his work as instructor in the fall. Dr. E. B. WILSON has been granted a year's leave of absence for study abroad.

PROFESSOR M. W. HASKELL, of the University of California, has received leave of absence and will spend the coming year abroad.

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## NEW PUBLICATIONS.

### I. HIGHER MATHEMATICS.

- ALEKSEIEF (V. G.). Theory of the rational invariants of binary forms according to Sophus Lie, Cayley, and Aronhold. Dorpat, 1899. 8vo. 8+232 pp. (Russian.)
- . Theory of rectilinear congruences in connection with the theory of surfaces, according to Prof. Darboux's lectures. Moscow, 1899. 8vo. 98 pp. (Russian.)
- ALTMeyer (A.). Ueber Tetraeder mit Höhenschnittpunkt bei einer Fläche zweiter Ordnung. (Diss.) Strassburg, 1901. 8vo. 47 pp.
- BASSET (A. B.). An elementary treatise on cubic and quartic curves. London and New York, Macmillan, 1901. 8vo. 16+255 pp. Cloth. (Cambridge University Press.) 10s. 6d.
- BLACK (C. W. M.). The parametric representation of the neighborhood of a singular point of an analytic surface. (Diss., Harvard University.) 8vo. 1902. (*Proceedings of the American Academy of Arts and Sciences* 37, pp. 281-330.)
- DUPORCQ (E.). Procès-verbaux sommaires du deuxième congrès international des mathématiciens, tenu à Paris du 6 au 12 août 1900. Paris, Imprimerie nationale, 1901. 8vo. 17 pp. (Exposition universelle internationale de 1900; ministère du commerce.)
- EGOROF (D. F.). Partial differential equations of the second order with two independent variables; general theory of the integrals; characteristics. Moscow, 1898. 8vo. 392 pp. (Russian.)
- EMCH (A.). Cyclographic transformation of ordinary space. 8vo. 1901. (*The University of Colorado Studies* 1, pp. 33-43.)
- . On the congruences of twisted curves. 8vo. 1900. (*The University of Colorado Studies* 1, pp. 29-32.)
- ERMAKOF (V. P.). Differential calculus. Lectures delivered at the Kief Polytechnic Institute. Part I: Differentiation of functions; Part II: Investigation of functions; Part III: Applications to geometry. Kief, 1899. 8vo. 52+100 pp. (Russian.)
- FUNK (R.). Die Konfiguration (16<sub>6</sub>, 20<sub>3</sub>), ihre analytische Darstellung und ihre Beziehungen zu gewissen algebraischen Flächen. (Diss.) Strassburg, 1901. 8vo. 32 pp.
- GAUSS (K. F.). General investigations of curved surfaces, of 1827 and 1825. Translated, with notes and a bibliography, by J. C. Morehead and A. M. Hildebrandt. Princeton, The University Library, 1902. 4to. 8+127 pp. Cloth. \$1.75