

To identify this with the equation of three terms as given by Weierstrass, write

$$\begin{aligned} a &= b_1 - a_1, \\ b &= a_1 - b_2, \\ c &= a_1 - b_3, \\ d &= a_2 - a_3, \end{aligned}$$

and use the notation given by Harkness and Morley, *Theory of Functions*, p. 313.

We have

$$\begin{aligned} a' &= b_1 - a_3, & a'' &= b_1 - a_2, \\ b' &= a_3 - b_2, & b'' &= a_2 - b_2, \\ c' &= a_3 - b_3, & c'' &= a_2 - b_3, \\ d' &= a_1 - a_2, & d'' &= a_3 - a_1, \end{aligned}$$

so that our equation (3) may be written

$$\sigma a \sigma b \sigma c \sigma d + \sigma a' \sigma b' \sigma c' \sigma d' + \sigma a'' \sigma b'' \sigma c'' \sigma d'' = 0,$$

which is equation (48) of the page referred to.

For higher values of n the equation (1) appears to be the simplest of the various possible extensions of the equation with three terms.

NOTES.

AMONG recent academic appointments are the following: Professor Samuel M. Barton, recently of the Virginia Agricultural and Mechanical College, has been appointed professor of mathematics at the University of the South, Sewanee, Tenn.; Dr. Alexander Macfarlane, formerly professor of physics at the University of Texas, has accepted a lectureship in electrical engineering at Lehigh University, South Bethlehem, Pa.; Dr. E. B. Van Vleck has resigned an instructorship at the University of Wisconsin in order to become associate professor of mathematics at Wesleyan University, Middletown, Conn.; Professor C. A. Waldo has been called from De Pauw University to the chair of mathematics at Purdue University, La Fayette, Ind.; Professor W. J. Hussey, of Stanford University, has been appointed astronomer at the Lick Observatory, to succeed Professor E. E. Barnard, who has been called to a chair of astronomy at the University of Chicago.

DR. PAUL STÄCKEL, of Halle, has been appointed professor extraordinarius at Königsberg, and Professor V. Eberhardt, of Königsberg, has been called to Halle.

WE are grieved to learn of the death of Dr. Ernst Ritter, on August 23, of typhoid fever, at the government hospital

on Ellis Island in New York harbor. He was on his way from Germany to begin his duties as assistant professor of mathematics at Cornell University.

THE STEINER PRIZE.—The Academy of Sciences of Berlin at the Leibnitz Meeting, July 3, 1890, announced the following problem for the Steiner Prize:—The solution of an important problem in the theory of lines of curvature of surfaces; preferably, the determination of the conditions under which the lines of curvature of algebraic surfaces are algebraic curves. No paper on this subject was received. In accordance with the terms of the Steiner foundation, the Academy has utilized the prize, thus unawarded, for the purpose of recognizing certain important geometrical contributious published during the past few years. One half of it has been awarded to Dr. Sigmund Gundelfinger, professor at the polytechnic school at Darmstadt, for his remarkable work leading to the fundamental investigation and development of the methods introduced into geometry by Hesse; the other half to Dr. Friedrich Schottky, professor at the University of Marburg, who has afforded valuable assistance in a series of most important special problems of geometry by demonstrating their relations to the theory of abelian functions of two, three, and four variables.

For the year 1900 the Academy announces the following problem for the Steiner Prize:—To completely solve any important, hitherto unsolved problem relating to the theory of curved surfaces, taking into account so far as possible the methods and principles evolved by Steiner. It is required that sufficient analytical explanations shall accompany the geometrical investigations to verify the correctness and completeness of the solution. Without wishing to limit the choice of subject the Academy takes the opportunity to call attention to the special problems to which Steiner has referred in his general remark at the end of his second paper on maximum and minimum in figures in a plane, on a sphere, and in space. For the solution of the problem a prize of 4000 marks is offered, with an additional sum of 2000 marks. Papers offered in competition may be written in German, French, English, Italian, or Latin, and must be submitted before December 31, 1899. The result will be announced at the Leibnitz Meeting of 1900.

THE attendance at the meeting of the British Association for the Advancement of Science, held at Ipswich, September 11–18, was somewhat smaller than at the Oxford meeting last year. Professor W. M. Hicks was president of Section A, representing mathematics and physics. His address, the sub

ject of which was "The fluid theories of ether and matter," appears in *Nature* of September 12.

THE French Association for the Advancement of Science met at Bordeaux, August 4, under the presidency of Émile Trélat. There were more than 800 members present. According to *La Nature* the following were among the most interesting mathematical papers read:—Mr. TORRIS, *On an algebraic machine*; Mr. COCCOZ, *On magic squares*; Mr. GUIMARET, *On vortices*; Mr. COLLIGNON, *On certain questions in geometry*.

WE take pleasure in announcing the following work as in press: *Theory of functions of a complex variable, with special reference to Riemann surfaces*. By Dr. H. DURÈGE, late Professor in the University of Prague. Authorized translation from the fourth German edition. By GEORGE EGBERT FISHER, M.A., Ph.D., and ISAAC J. SCHWATT, Ph.D., of the University of Pennsylvania, Philadelphia. The work is being published by the translators.

AMONG the courses for the winter semester at Berlin are the following:—Professor Fuchs: Analytical mechanics; Abelian functions;—Professor Frobenius: Theory of numbers;—Professor Schwarz: Synthetic geometry; Selected chapters from the theory of analytical functions; Theory of elliptic functions, making use of his edition of "Formeln und Lehrsätze zum Gebrauche der elliptischen Functionen";—Professor Knoblauch: Analytical geometry; Definite integrals; Mathematical exercises for younger students;—Professor Hensel: Algebra; Integral calculus; Exercises in algebra;—Professor Hettner: Theory of probabilities;—Dr. Schlesinger: Theory of Fourier's series and spherical harmonics, with applications to questions of mathematical physics; Theory of substitution groups, with applications to linear differential equations;—Dr. Kötter: Geometry of circle and sphere systems, with special reference to bicircular curves and surfaces of the fourth order; Differential calculus and introduction to analysis; Exercises;—Dr. Hoppe: Analytical geometry, in connection with his text-book; Differential calculus and series, in connection with his text-book;—Dr. Wien: Hydrodynamics.

AMONG the courses for the winter semester at Leipzig are the following: Professor Scheibner: On the hypergeometric series and Eulerian integrals;—Professor Neumann: Selected chapters from mathematical physics; Discussion of mathematical problems;—Professor Lie: Introduction to metrical geometry; On differential equations which admit infinitesimal transformations; Exercises in mathematical seminarium;—

Professor Mayer: General introduction to the differential and integral calculus; Exercises;—Professor Engel: Introduction to analytical mechanics; Higher algebra; Conference on mathematical problems;—Dr. Scheffers: Introduction to the theory of linear differential equations; Descriptive geometry accompanied by exercises; Kinematics (theory of mechanisms).

NEW PUBLICATIONS.

I. HIGHER MATHEMATICS.

- AHRENS (W.).** Ueber eine Gattung von n -fach periodischen Functionen von n reellen Veränderlichen. [Diss.] Rostock, 1895. 8vo. 36 pp. Mk. 1.20
- ARZELÀ (C.).** Sull' integrabilità delle equazioni differenziali ordinarie; nota letta alla R. Accademia delle scienze dell' Istituto di Bologna nella sessione del 24 Marzo 1895. Bologna, Gamberini e Parmegiani, 1895. 4to. 16 pp.
- BÄCKLIN (G.).** Allmän Mathematik eller s. k. Proportionslära. Upsala, 1893. 4to. 22 pp. Illustrated.
- BALLAUF.** Einige Hauptsätze aus der Lehre von den Kegelschnitten in elementarer Behandlung. Theil I. Gebweiler, 1894. 4to. 13 pp. 1 plate. Mk. 1.50
- BIERMANN (O.).** Elemente der höheren Mathematik. Vorlesungen zur Vorbereitung des Studiums der Differentialrechnung, Algebra, und Functionentheorie. Leipzig, Teubner, 1895. 8vo. 12 and 381 pp. Mk. 10.00
- BOCKWOLDT (G.).** Die analytische Geometrie in der Prima des Gymnasiums. Theil II. Neustadt, 1895. 8vo. 16 pp. 2 plates. Mk. 1.20
- BODE (J.).** Die Grundlagen der höheren Mathematik in schulmässiger Behandlung. Mülheim, 1895. 8vo. 37 pp. Mk. 1.20
- BREUER (P. J.).** Die gemeinen Logarithmen. Wipperfürth, 1894. 4to. 19 pp.
- CAYLEY (A.).** An elementary treatise on elliptic functions. 2d edition. London, Bell, 1895. 8vo. 390 pp. 15s.
- CRIVETZ (T.).** Essay on the postulate of Euclid. (*In Rumanian.*) Bucharest, Socecă, 1895. 8vo. 40 pp. Illustrated. Mk. 2.00
- ENGEL (F.).** See STÄCKEL (P.).
- EPSTEIN (S. S.).** Die vier Rechnungsoperationen mit Bessel'schen Functionen, nebst einer geschichtlichen Einleitung. [Diss.] Bern, 1894. 8vo. 54 pp. Mk. 1.50
- FOCKE (A.).** Ueber die Auflösung diophantischer Gleichungen mit Hilfe der Zahlentheorie. Magdeburg, 1895. 4to. 27 pp. Mk. 1.50
- FRANK (H.).** Einführung in die Infinitesimalrechnung. [Progr.] Berlin, 1895. 4to. 11 pp.