

tive if  $a$  is sufficiently large. The fact that we get different values for  $\Omega$  according to the order of integration shows that  $T$  cannot be everywhere finite, continuous, and single valued, and this can be explained only by the vanishing of  $\sigma^2 + \tau^2$  (since  $r$ , which also occurs in the denominator of  $T$  is a factor of each term of the numerator). A point where  $\sigma^2 + \tau^2$  vanishes is a root of  $f(z) = 0$ .

In the proofs above given I have started with Gauss from the function  $\frac{zf'(z)}{f(z)}$ . There are, however, other functions which might have been used in almost exactly the same way, as for instance  $\frac{z^n}{f(z)}$  and  $\frac{1}{f'(z)}$ . In fact Gauss's proof would be somewhat simplified by the use of this last function.

HARVARD UNIVERSITY.

---

NOTES.

A REGULAR meeting of the AMERICAN MATHEMATICAL SOCIETY was held in New York, Saturday afternoon, April 27, at three o'clock. There were fourteen members present. In the absence of the president and vice-president, Professor Mansfield Merriman occupied the chair. On the recommendation of the council the following persons, nominated at the preceding meeting, were elected to membership: Professor Sara Antoinette Acer, Wells College, Aurora, N. Y.; Dr. Harris Hancock, University of Chicago, Chicago; Professor Munroe Benjamin Snyder, Central High School, Philadelphia. One nomination for membership was received. The following papers were presented:

(1) "On the derivation of the equations of rotation of bodies of variable form," by Professor R. S. WOODWARD.

(2) "A theory of mathematical methods," by Dr. E. M. BLAKE.

(3) "Kinetic stability of central orbits," by Professor W. WOOLSEY JOHNSON.

Professor Johnson's paper appears in the present number of the BULLETIN on page 193.

B. G. TEUBNER, of Leipzig, announces as in press the third volume of Dr. ERNST SCHRÖDER'S *Algebra der Logik*; it is devoted to the algebra and logic of relatives. The same publisher has in preparation an edition, in two 8vo volumes, of JULIUS PLÜCKER'S collected mathematical and physical papers. This publication is due to the initiative of the Göttingen Academy of Sciences. The first volume, which will be

adorned with a portrait of the author, will contain all the mathematical papers. Those of Plücker's works that have appeared in book form and are still obtainable (viz., *Analytisch-geometrische Entwicklungen*, *System der analytischen Geometrie*, *Theorie der algebraischen Kurven*, *Neue Geometrie des Raumes gegründet auf die Betrachtung der geraden Linie als Raumelement*) are excluded; but everything else has been carefully collected. Professor A. Schoenflies is the editor of this first volume, while the second, containing the physical papers, is under the care of Dr. F. Pockels.

IN the February number of the *Intermédiaire des mathématiciens* (vol. 2, p. 110) Professor E. Lampe reports that Dr. Franz Meyer, in collaboration with other mathematicians, has undertaken the publication of a mathematical dictionary, or encyclopædia, in about six volumes. The project was discussed last year at the Vienna meeting of the German mathematical association, and will have the financial support of the academies of Vienna, Berlin, Munich, Göttingen, and Leipsic. B. G. Teubner will be the publisher.

THE Department of Mathematics at Columbia College will give during the next academic year the following graduate courses, each occupying three hours a week throughout the entire year: (1) General theory of functions, by Professor T. S. Fiske; (2) Theory of substitutions, by Professor F. N. Cole; (3) Analytical theory of curves of double curvature and surfaces, by Mr. J. Maclay; (4) Ordinary and partial differential equations, by Mr. J. E. Hill; (5) Advanced differential and integral calculus, by Dr. J. B. Chittenden. The undergraduate work of the department will include courses in Elementary solid geometry, Algebra, Trigonometry, Analytical geometry, Projective geometry, Differential and integral calculus, Theory of equations, and Analytical geometry of three dimensions. These courses will be given by Dean Van Amringe, Professor Fiske, Mr. Maclay, Dr. Chittenden, and Mr. Hill. The courses in mathematics at Barnard College will be given by Professor Cole, Dr. Chittenden, and Mr. Hill.

AMONG those whom the mathematical world has recently lost through death are T. P. Kirkman, F.R.S., who died in London about the middle of February; Professor J. Worpitsky, who died in Berlin, March 8; Dr. E. D. F. Meissel, who died at Kiel, March 11; and Professor Schläfli, who died at Bern, March 20.

THE following are the mathematical courses for the current summer semester at Berlin:—Professor Fuchs: Applications of

the elliptic functions; On the representation of functions which are defined by differential equations;—Professor Frobenius: Theory of determinants; Theory of algebraic equations (second part);—Professor Schwarz: Theory of the complex quantity; On curved surfaces and curves of double curvature; Introduction to the theory of analytical functions;—Professor Knoblauch: Integral calculus; Theory of partial differential equations of the first and second order; General theory of line systems;—Professor Hensel: Synthetic geometry; Differential calculus;—Professor Hettner: Dynamics; Mathematical exercises for new students;—Professor Lehmann-Filhés: Method of least squares;—Dr. Schlesinger: Plane and solid analytical geometry; On Gauss's investigations in the theory of elliptic functions;—Dr. Kötter: Analytical treatment of plane algebraic curves;—Dr. Hoppe: Integral calculus; Analytical mechanics;—Dr. Glan: Quaternions.

THE following are the mathematical courses for the current summer semester at Leipzig:—Professor Scheibner: Introduction to the infinite analysis;—Professor C. Neumann: Theory of potential and application to heat and electricity;—Professor Bruns: Mathematical geography, general astronomy and astrophysics; The solution of equations and theory of errors according to the method of least squares;—Professor Lie: Introduction to the theory of differential equations; Applications of the differential and integral calculus to geometry; Seminarium on group theory, differential invariants, and contact transformations;—Professor Mayer: Partial differential equations of the first order and Pfaff's problem; Introduction to algebra and the theory of determinants; Seminarium on the calculus of variations;—Professor Engel: Higher algebra;—Dr. Scheffers: Introduction to analytical geometry; Introduction to the theory of linear differential equations.

AMONG recent changes at Yale University we note that Dr. Irving Fisher, assistant professor of mathematics, has been, at his own desire, transferred to the department of political science. Dr. Fisher has done considerable work in the application of mathematics to economics. One of his papers on this subject was reviewed in the BULLETIN for June, 1893, p. 204. Dr. James Pierpont, a graduate of Yale and of the University of Vienna, has been appointed to an instructorship in the department of mathematics. His time will be divided equally between graduate and undergraduate courses.

DR. ERNST RITTER, privat-docent in mathematics at the University of Göttingen, has been appointed an assistant professor of mathematics at Cornell University. Dr. Ritter

took his doctor's degree at Göttingen in 1892. He has written some important papers on automorphic functions, which have been published in the *Mathematische Annalen*.

HARVARD UNIVERSITY. Besides regular undergraduate courses, the class-room work in which will amount to eighteen hours a week throughout the year, the following more advanced mathematical courses are offered for the year 1895-96:—By Professor J. M. Peirce: Quaternions (first course); Curves and surfaces; Linear associative algebra. †—By Professor Byerly: Modern geometry; Analytical mechanics.—By Professors Byerly and B. O. Peirce: Fourier's series, spherical harmonics, and the potential function.—By Professor B. O. Peirce: Hydromechanics.—By Professor Osgood: Differential and integral calculus (second course); Higher algebra; Theory of functions (second course). †—By Professor Bôcher: Theory of equations and invariants †; Infinite series, products, and continued fractions †; Theory of functions (first course); Picard's *Traité d'Analyse*, vol. 1 †; Functions defined by linear differential equations. †

The above courses will each consist of three lectures a week throughout the year except those marked †, which consist of one half that number of lectures. The following three courses, in which the work will consist of reading and investigation to be carried on by the students under the direction of the instructor, are also offered:—By Professor J. M. Peirce: Algebra of logic. By Professor Osgood: Klein's Ikosaeder. By Professor Bôcher: Lamé's products.