the general electrostatic problem; its first section deals with the general properties of Newtonian potentials and would seem to belong in an earlier division where these functions were first considered. The three remaining sections are devoted to the method of the arithmetic mean and Beer's treatment of the equilibrium of a charge on a conductor, with the example of the ellipsoid.

In general the author has been conservative in making changes. More valuable additions might have been made in some cases. Linear partial differential equations of second order, for instance, receive a scant two pages, which give only the device of finding particular solutions in the form of exponential functions with linear exponents. Undoubtedly the systematic development of integral equations and their applications, of the principle of relativity, and in all likelihood, of Lebesgue's theory of integration, will make necessary at some future time a book treating the same subjects in radically new ways. But for the present, and for some time to come, Weber's book, with its origins in Riemann's lectures, will continue to be indispensable. The new edition will find its way into the more complete libraries, although for smaller collections the previous one will prove wellnigh as useful, if a prediction can be made on the basis of the first volume of the new edition.

O. D. KELLOGG.

NOTES.

THE concluding (October) number of volume 34 of the *American Journal of Mathematics* contains the following papers: "The involutional birational transformation of the plane, of order 17," by VIRGIL SNYDER; "On the problem of two fixed centers and certain of its generalizations," by A. M. HILTEBEITEL; "Abstract definitions of all the substitution groups whose degrees do not exceed seven," by G. A. MILLER; "The attraction of a homogeneous spherical segment," by G. GREENHILL.

THE Prince Jablonowski society of Leipzig announces the following prize problem:

"What is the expression of the C. Neumann theorem (*Abhandlungen d. k. S. Gesellschaft d. Wissenschaften*, 1909) in the theory of the Newtonian potential, applied to the oval shaped

solid derived from the ellipsoid by the method of reciprocal radii? The society desires that this question be answered, if not in its most general form, at least for some special case, for example, when the given ellipsoid is one of revolution, and the center of the transformation (to be carried out by the method of reciprocal radii) is at the center of the ellipsoid."

The value of the prize is 1,500 marks. Competing memoirs should be sent to the secretary of the society under the usual conditions before October 31, 1913.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY. The following advanced courses in mathematics are given during the present academic year.—By Professor H. W. TYLER: History of the mathematical sciences and teaching of elementary mathematics, two hours.—By Professor D. P. BARTLETT: Theory of probability and method of least squares, twenty periods, second half-year.—By Professor F. S. WOODS: Partial differential equations, two hours, first half-year; Elements of the theory of functions of a complex variable, two hours, second half-year; Advanced geometry, two hours, second half-year.—By Professor F. H. BAILEY: Fourier's series, Laplace's coefficients, two hours.—By Professor E. B. WILSON: Statistical methods in theoretical physics, one hour; Hydrodynamics, twenty periods, first half-year; Discrete systems, two hours, first half-year; Continuous media, two hours, second half-year.—By Professors TYLER, WOODS, WILSON, GEORGE: Advanced calculus, two to four hours.

THE following courses in mathematics are announced at the German universities during the winter semester, 1911–1912:

UNIVERSITY OF BERLIN.—By Professor H. A. SCHWARZ: Elementary geometric derivation of the most important properties of conics, two hours; Synthetic geometry, four hours; Theory of analytic functions, I, four hours; Colloquium, two hours; Seminar, two hours.—By Professor G. FROBENIUS: Analytic geometry, four hours; Theory of numbers, four hours; Seminar, two hours.—By Professor F. SCHOTTKY: Higher algebraic curves, four hours; Theory of automorphic and polygonal functions, four hours; Seminar, two hours.—By PROFESSOR G. HETTNER: Theory of probabilities and of errors of observation, two hours.—By Professor J. KNOBLAUCH: Differential calculus, four hours; with exercises, one hour; Theory of elliptic functions, four hours.—By Professor R. LEHMANN-

FILHÉS: Integral calculus, four hours; Determinants, four hours. —By Professor I. SCHUR: Theory of algebraic equations, four hours; Theory of functions, II, four hours.

UNIVERSITY OF BONN.—By Professor E. STUDY: Introduction to analytic geometry, four hours; Differential geometry, II, two hours; Seminar, two hours.—By Professor F. LONDON: Synthetic geometry, two hours; Differential and integral calculus, II, four hours; Seminar, two hours.—By Professor F. HAUSDORFF: Introduction to the theory of functions, four hours; Fourier series and related developments, two hours; Seminar, two hours.—By Dr. J. O. MÜLLER: Algebraic equations (Galois' theory), three hours.—By Professor PH. FURT-WÄNGLER: Selected chapters of technical mechanics, two hours.

UNIVERSITY OF BRESLAU.—By Professor R. STURM: Plane analytic geometry, four hours: Geometric relations, II, four hours; Seminar, two hours.—By Professor A. KNESER: Elliptic functions, four hours; Integral equations, two hours; Seminar, two hours.—By Professor E. SCHMIDT: Integral calculus, four hours; Theory of sets, two hours; Seminar, two hours.—By Dr. W. SCHNEE: Differential geometry, three hours; Selected chapters in the theory of numbers, two hours.

UNIVERSITY OF ERLANGEN.—By Professor P. A. GORDAN: Theory of numbers, four hours.—By Professor M. NOETHER: Plane analytic geometry, four hours; Theory of abelian functions, four hours; Descriptive geometry, four hours.

UNIVERSITY OF FREIBURG: By Professor S. STICKELBERGER: Theory of functions, four hours; Higher plane curves, three hours; Seminar, two hours.—By Professor L. HEFFTER: Analytic geometry of space, four hours; with exercises, one hour; Analytic mechanics of connected masses, three hours; Seminar, one hour.—By Professor O. BOLZA: Introduction to the theory of integral equations, two hours; Seminar, two hours.—By Professor A. LOEWY: Differential calculus, four hours; with exercises, one hour; Theory of algebraic equations, II, three hours; Seminar, two hours.—By Dr. N. SEITH: Projective geometry, two hours.

UNIVERSITY OF GIESSEN.—By Professor E. NETTO: Higher algebra, three hours; Analytic geometry of space, three hours;

Seminar, two hours.—By Professor L. SCHLESINGER: Differential and integral calculus, with exercises, five hours; Theory of the logarithmic potential, four hours; Seminar, two hours.— By Professor H. GRASSMANN: Analytic mechanics, II, four hours.

UNIVERSITY OF GÖTTINGEN.—By Professor F. KLEIN: Introduction to differential and integral calculus, II, four hours; Seminar, two hours.—By Professor D. HILBERT: Logical foundations of mathematics, one hour; Mechanics of continua, four hours; Seminar, two hours.—By Professor E. LANDAU: Analytical theory of numbers, four hours; Seminar, two hours.— By Professor C. RUNGE: Mechanics with exercises, six hours.— By Dr. E. WEYL: Determinants, two hours; Advanced theory of functions, four hours; Exercises in the calculus, two hours.— By Dr. O. TOEPLITZ: Introduction to the theory of functions, four hours; with exercises, two hours.—By Dr. A. HAAR: Curves and surfaces, four hours.—By Professor F. BERNSTEIN: Calculus of insurance, two hours; Mathematics of statistics, three hours.—By Professor W. VOIGT: Partial differential equations of mathematical physics, four hours.

UNIVERSITY OF GREIFSWALD.—By Professor F. ENGEL: Theory of groups of transformations, II, four hours; Differential and integral calculus, I, four hours; Analytic geometry of space, two hours; Seminar, two hours.—By T. K. VAHLEN: Theory of functions, four hours; Kinematics and mechanism, one hour; Seminar, two hours.—By Dr. W. BLASCHKE: Analytic mechanics, II, four hours; Descriptive geometry, with exercises, four hours.

UNIVERSITY OF HALLE.—By Professor G. CANTOR: Differential and integral calculus, I, five hours; Seminar, two hours.— By Professor A. WANGERIN: Integral calculus, with exercises, four hours; Applications of elliptic functions, two hours; spherical trigonometry and geography, two hours; Seminar, two hours.—By Professor A. GUTZMER: Ordinary differential equations, four hours; Analytic mechanics, four hours; Seminar, two hours.—By Professor V. EBERHARD: Analytic geometry of space, four hours; Colloquium, two hours.

UNIVERSITY OF JENA.—By Professor J. THOMAE: Applications of the infinitesimal calculus to geometry, five hours.—

By Professor L. HAUSSNER: Theory of numbers, four hours;
Differential and integral calculus, II, five hours; Analytic
geometry of space, four hours; Proseminar, two hours; Seminar,
one hour.—By Professor G. FREGE: Riemann's theory of func-
tions, four hours; Symbolic notation, one hour.—By Dr. M.
WINKELMANN: Technical mechanics, four hours; with exer-
cises, one hour; Vector analysis, one hour.

UNIVERSITY OF KIEL.— By Professor L. POCHHAMMER:
Differential geometry, four hours; Partial differential equations,
four hours; Seminar, two hours.—By Professor G. LANDSBERG:
Integral calculus, four hours; Higher algebra, four hours;
Seminar, two hours.—By Professor M. DEHN: Introduction to
higher analysis, three hours; Analytic geometry of space,
four hours; Exercises in applied mathematics, two hours.

UNIVERSITY OF KÖNIGSBERG.—By Professor W. F. MEYER:
Integral calculus, three hours; with exercises, one hour; In-
troduction to higher geometry, three hours; Seminar, two hours.
—By Professor A. SCHOENFLIES: Differential geometry of
curves and surfaces, four hours; Seminar, two hours.—By Dr. A.
KALUZA: Analytic geometry of space, four hours; with exercises,
one hour; Determinants, two hours.—By Dr. W. BIEBERBACH:
Partial differential equations, two hours; colloquium, one hour.

UNIVERSITY OF LEIPZIG.—By Professor K. ROHN: Analytic
geometry of space, four hours; Application of the differential
calculus to space curves and surfaces, four hours; Seminar,
two hours.—By Professor O. HÖLDER: Higher algebra, partic-
ularly Galois's theory of equations, two hours; Elliptic functions,
four hours; Seminar, two hours.—By Professor G. HERGLOTZ:
Mechanics, five hours; Fourier series and definite integrals,
two hours; Seminar, two hours.—By Professor P. KOEBE:
Differential and integral calculus, five hours; with exercises,
one hour; Potential theory and partial differential equations,
two hours.—By Dr. R. KÖNIG: Linear differential equations
in a complex field, two hours.

UNIVERSITY OF MARBURG.—By Professor K. HENSEL: Integral
calculus, four hours; Algebra, four hours; Seminar, two hours.—
By Professor E. NEUMANN: Analytic theory of differential equa-
tions, four hours; Proseminar, two hours; Seminar, two hours.
—By Professor W. v. DALWIGK: Analytic mechanics, II, two

hours; Advanced chapters from the theory of analytic functions, two hours; Perspective and photogrammetry, two hours; with exercises, three hours.—By Dr. E. HELLINGER: Analytic geometry of space, particularly of quadric surfaces, four hours; Selected chapters from the theory of functions of real variables, one hour; Exercises in the lower Seminar, one hour.

UNIVERSITY OF MUNICH.—By Professor F. LINDEMANN: Differential calculus, five hours; Theory of abelian functions, four hours; Mathematical foundation of insurance, two hours; Seminar, two hours.—By Professor A. VOSS: Plane analytic geometry, four hours; Mechanics, I, four hours; Seminar, two hours.—By Professor A. PRINGSHEIM: Elements of the theory of numbers, four hours; New methods and results in the theory of functions, four hours.—By Professor H. BRUNN: Elements of higher mathematics and foundations of descriptive geometry with exercises, four hours.—By Professor K. DOEHLEMANN: Descriptive geometry, I, five hours; with exercises, three hours; Synthetic geometry, five hours; with exercises, one hour.— By Dr. G. HARTOGS: Elementary geometry of two and three dimensions; Complement of algebraic analysis, one hour.

UNIVERSITY OF ROSTOCK.—By Professor O. STAUDE: Differential and integral calculus, four hours; Applications of the differential calculus to geometry, four hours; Seminar, two hours.

UNIVERSITY OF STRASSBURG.—By Professor H. WEBER: Differential and integral calculus, four hours; Partial differential equations of mathematical physics, two hours; Seminar, two hours.—By Professor F. Schur: Analytic geometry of the plane and of space, four hours; Selected chapters from the theory of surfaces, one hour; Seminar, two hours.—By Professor M. SIMON: Plane and spherical trigonometry, two hours; Non-euclidean geometry, two hours.—By Professor J. WELLSTEIN: Applications of the infinitesimal calculus, four hours; Determinants, two hours; Seminar, two hours.—By Professor P. EPSTEIN: Fourier series and related developments, two hours.

UNIVERSITY OF TÜBINGEN.—By Professor A. v. BRILL: Introduction to higher mathematics, four hours; Theory of algebraic curves, three hours; Seminar, two hours.—By Professor L. MAURER: Higher analysis, II, four hours; Higher algebra,

three hours; Seminar, two hours.—By Professor O. PERRON: Elementary analysis, four hours; Descriptive geometry, three hours; with exercises, three hours; Seminar, two hours.

UNIVERSITY OF WÜRZBURG.—By Professor G. ROST: Analytic geometry of space, four hours; Plane analytic geometry, four hours; Spherical astronomy, II, two hours; Political arithmetic, two hours; Seminar, two hours; Introduction to higher mathematics (for students of insurance), two hours.—By Professor E. v. WEBER: Differential calculus, four hours; with exercises, two hours; Introduction to vector analysis, two hours; Seminar, two hours.—By Dr. E. HILB: Algebraic curves, four hours; Definite integrals, four hours; Seminar, two hours.

ON June 14 an academic prize was awarded by the philosophical faculty of the University of Göttingen to Mr. DUNHAM JACKSON, Hooper Fellow of Harvard University, for an essay entitled: "Ueber die Genauigkeit der Annäherung stetiger Funktionen durch ganze rationale Funktionen gegebenen Grades und trigonometrische Summen gegebener Ordnung."

THE Gauss monument on the Hohenhagen, near Dransfeld, was dedicated July 31, the memorial address being delivered by Professor W. VOIGT, of the University of Göttingen.

DURING the Easter vacation of 1912 an extensive course in mathematics and physics for advanced teachers will be held at Göttingen under the direction of Professor F. KLEIN.

PROFESSOR R. GANS, of the University of Tübingen, has been transferred to the University of Strassburg.

DR. R. KÖNIG has been appointed docent in mathematics at the University of Leipzig.

DR. H. v. SANDEN has been appointed docent in mathematics at the University of Göttingen.

DR. R. SCHIMMACK has been appointed docent in mathematical pedagogy at the University of Göttingen.

DR. L. SCHLEIERMACHER has been appointed docent in mathematics at the technical school of Darmstadt.

PROFESSOR E. FISCHER, of the technical school at Brünn, has accepted a professorship of mathematics at the University of Erlangen.

DR. R. FUCHS, of the technical school at Berlin, has been promoted to an associate professorship of mathematics.

PROFESSOR H. V. KOCH, of the technical school at Stockholm, has been appointed professor of mathematics at the University of Stockholm, as successor to Professor G. Mittag-Leffler, retired.

DR. G. MAJCEN, of the University of Agram, has been promoted to a professorship of mathematics.

DR. E. SALKOWSKY, of the technical school at Berlin, has been promoted to a professorship of mathematics.

PROFESSOR A. SCHOENFLIES, of the University of Königsberg, has accepted the professorship of mathematics at the academy of social science at Frankfort.

DR. A. N. WHITEHEAD has been appointed lecturer in applied mathematics at University College, London.

PROFESSOR B. F. YANNEY, of Mount Union College, Ohio, has accepted the professorship of mathematics at Wooster University.

DR. H. E. BUCHANAN has been appointed professor of mathematics at the University of Tennessee.

PROFESSOR H. L. RIETZ, of the University of Illinois, has been promoted to an associate professorship of mathematics. Dr. E. B. STOUFFER has been appointed instructor in mathematics.

MR. O. T. GECKELER has been appointed instructor in mathematics in the school of applied science of the Carnegie Technical Schools, Pittsburgh, Pa.

DR. F. T. H'DOUBLER has been appointed instructor in mathematics at the University of Wisconsin.

MR. A. B. DUNNING has been appointed assistant professor of mathematics at Boston University.

DR. E. G. BILL has been appointed instructor in mathematics at Purdue University.

DR. S. LEFSCHETZ, of Clark University, has been appointed instructor in mathematics in the University of Nebraska.

AT Northwestern University Mr. C. H. YEATON has been appointed instructors in mathematics.

MR. L. C. COX has been appointed instructor in mathematics at Pennsylvania State College.

PROFESSOR FRANZ MERTENS, of the University of Vienna, has retired from active service.

PROFESSOR E. L. HANCOCK, of the Worcester Polytechnic Institute, died on October 1 at the age of thirty-eight years. Professor Hancock had been a member of the American Mathematical Society since 1902.

PROFESSOR J. GRÜNWALD, of the German University at Prague, died July 1, at the age of 35 years.

PROFESSOR H. SCHUBERT, of the Johanneum in Hamburg, and editor of the Sammlung Schubert, died July 20, at the age of 63 years.

NEW PUBLICATIONS.

I. HIGHER MATHEMATICS.

AHRENS (W.). Gelehrten-Anekdoten. 2ter Teil. Berlin-Schöneberg, Sack, 1911.   M. 2.40

AMBRECHT (A.). Zum grossen Fermatschen Satz. Dresden, Köhler, 1911. 8vo. 4 pp.   M. 0.50

AUSSANT-CARÀ (P.). Sulla discussione dei probleme riducibili al secondo grado, con applicazioni. Livorno, 1910. 8vo. 58 pp.   M. 1.50

BAUCH (B.). Studien zur Philosophie der exakten Wissenschaften. Heidelberg, 1911.   M. 5.00

BERNSTEIN (S. N.). The theory of probabilities. (Russian.) Charkow, 1911. 8vo. 254 pp.

BOREL (E.). Eléments de la théorie des probabilités. 2e édition. Paris, Hermann, 1911. 8vo. 191 pp.   Fr. 6.00

BOSMANS (H.). La première édition de la " Clavis Mathematica" d'Oughtred. Son influence sur la "Géométrie" de Des Cartes. Louvain, Geutrick. 1911.

BÜCHER, Neue, über Naturwissenschaften und Mathematik. (Die Neuigkeiten des deutschen Buchhandels, nach Wissenschaften geordnet.) Mitgeteilt Sommer 1911. Leipzig, Hinrichs. 8vo. pp. 23-46.   M. 0.30

BUSMANN (F.). Ein neuer Kegelschnittzirkel. Bonn a. R., Hilgers.

CLAIRIN (J.). Cours de mathématiques générales. Tome I: Algèbre, géométrie analytique, calcul différentiel. Lille, Janny, 1911. 4to.