

gation was practically completed. Nothing shows more clearly the great assiduity and rapidity of Gauss's researches than the way he carried through his computations on Pallas to the extent of over 340,000 figures in the time of about three months.

With this volume VII the edition of Gauss's works, which has occupied nearly forty years in publication, is complete except for one miscellaneous volume, the tenth, which will probably soon be given to the public. The scientific world owes a deep debt of gratitude to those who have so cheerfully spent a large amount of their time and energy on this great and highly valuable undertaking.

E. B. WILSON.

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#### NOTES.

THE July number (volume 29, number 3) of the *American Journal of Mathematics* contains the following papers: "Concerning a certain type of continued fractions depending on a variable parameter," by T. E. MCKINNEY; "Twisted curves whose tangents belong to a linear complex," by V. SNYDER; "Groups in which every subgroup is either abelian or dihedral," by G. A. MILLER; "Lines of curvature of a surface," and "The ovals of the plane sextic curve," by J. E. WRIGHT.

AT the meeting of the London mathematical society held on May 9, the following papers were read: By H. F. BAKER, "Rational expression of the invariants of a quintic by means of three"; by H. LAMB, "Secular stability"; by F. J. W. WHIPPLE, "A lemma connected with Fourier's series."

AT the meeting held on June 13 the following papers were read: By A. R. FORSYTH, "Note on a special set of classes of partial differential equations of the second order"; by T. J. I'A. BROMWICH, "Various extensions of Abel's lemma"; by J. W. L. GLAISHER, "On the number of representations of a number as a sum of  $2r$  squares, when  $2r$  does not exceed 18"; by A. E. WESTERN, "An extension of Eisenstein's law of reciprocity"; by A. B. BASSET, "On certain singular points of surfaces"; by E. B. ELLIOTT, "The minimum necessary postulates as to a function to be defined as analytic over a region."

THE last list of members of the Société mathématique de France, published in January, contains 280 names, of which 20 are Americans. The meetings of the society are held fort-

nightly except during the summer vacation. The society was founded in 1872, and at once began the publication of its *Bulletin*, the first volume appearing in 1873. A volume has been issued every year since, the parts appearing quarterly. There are 75 journals on its exchange list. Instead of having a special editor, the *Bulletin* is published by the secretaries, who are elected annually. The officers for the present year are: president, Dr. E. BLUTEL; secretaries, Dr. S. SERVANT and Professor L. RAFFY.

THE following mathematical works are announced to be in the press of the Carnegie Institution of Washington and will appear in a few weeks: "Synopsis of linear associative algebra. A report on its natural development and the results reached up to the present time," by J. B. SHAW; "Researches on the performance of the screw propeller," by W. F. DURAND; "Dynamical meteorology and hydrography," by V. BJERKNES and J. W. SANDSTRÖM.

THE following parts of the Encyclopädie der mathematischen Wissenschaften are announced by Teubner of Leipzig to be in the press, and will probably appear during the summer: II, 2, Elliptische Funktionen, by J. HARKNESS and W. WIRTINGER; Automorphe Funktionen, by R. FRICKE; III, 1, Beziehung und Gegensatz von synthetischer und analytischer Geometrie in seiner historischen Entwicklung im neunzehnten Jahrhundert, by G. FANO; Die Gruppentheorie als geometrisches Einteilungsprinzip, by G. FANO; IV, 1, Die elementare Dynamik, by P. STÄCKEL, with additions by J. PETERSEN; IV, 2, Theorie des Schiffes, by A. KRILOFF; Grundlegung der mathematischen Elastizitätslehre, by C. H. MÜLLER and A. TIMPE; Specielle Ausführungen zur Statik elastischer Körper, by O. TEDONE and A. TIMPE; Schwingungen elastischer Körper, insbesondere Akustik, by H. LAMB; VI, 1, Höhere Geodäsie, by P. PIZZETTI.

Of the French edition of the encyclopædia, I<sub>1</sub>,<sup>(2)</sup> containing Nombres irrationnels et notion de limite, and algorithmes illimités by A. PRINGSHEIM and J. MOLK have just appeared. The details of the editorship of IV, mechanics, have been made public; it is to be published in five volumes under the general direction of Professors Appell and Molk.

THE mathematical and physical section of the Royal society of Naples announces the following prize problem: "A syste-

matic exposition of the results thus far obtained on geometric configurations of the plane and of higher spaces, putting them in relation with the theory of substitutions, and containing if possible some new contribution." Competing memoirs must be written in Italian, Latin or French, and submitted to the secretary not later than June 30, 1908. The prize of 500 lire will be awarded on the first Sunday of 1909.

THE Royal academy of Belgium announces the following prize problems for 1908 :

1. Make a systematic exposition of researches already made of critical phenomena in physics. Complete our knowledge of this question by new researches. Prize of 800 francs.

2. An important contribution to the study of the differential equation  $Xdx + Ydy = 0$  is desired,  $X, Y$  being known quadratic functions of  $x, y$ . Prize of 800 francs.

3. New researches on the calorific conductivity of liquids and solutions is desired. Prize of 800 francs.

4. Make a historical and critical study of the experiments on unipolar induction of Weber, and elucidate by means of new experiments, the laws and the interpretation of the physical fact. Prize of 800 francs.

5. Systematize and complete the investigations made in the calculus of variations since 1850. Prize of 600 francs.

Memoirs should be written in French or Flemish and sent to the secretary before August 1, 1908.

THE prize problem of the Prince Jablonowski society of Leipzig for 1910 is as follows : "Most problems in electrostatics are reducible to the determination of the Green distributions of masses, and consequently these distributions are of primary importance for the theory of electrostatics and for the entire potential theory. From recent memoirs (*Leipziger Berichte* for 1906, pages 483-558) it can doubtless be concluded that in the theory of the logarithmic potential for any closed curve the two Green distributions corresponding to the inner and outer spaces can be reduced to a single distribution, the so-called 'fundamental distribution,' and that an analogous property exists in the theory of the newtonian potential for any closed surface. However, in the memoirs mentioned, much is still left to be desired ; accordingly the society proposes the following problem : A memoir is desired, in which the theory of the 'fundamental distribution,' either in clearness

and rigor or in extent and completeness, shall be considerably advanced." The prize is 1,500 marks.

THE following advanced courses in mathematics are announced for the academic year 1907-1908 :

UNIVERSITY OF CHICAGO (October 1 to June 15). The total number of hours is indicated. — By Professor E. H. MOORE : Selected chapters in analysis, 48 hours ; Theory of functions of a complex variable, 24 hours ; Seminar, theory of functions of a real variable, 24 hours. — By Professor O. BOLZA : Advanced integral calculus, 96 hours ; Calculus of variations, 96 hours. — By Professor H. MASCHKE : Solid analytics and determinants, 48 hours ; Algebraic analysis, 48 hours ; Projective synthetic geometry, 48 hours ; Differential geometry, 96 hours ; Partial differential equations, 48 hours. — By Professor L. E. DICKSON : Finite groups with applications to algebra and linear substitution groups, 96 hours. — By Professor H. E. SLAUGHT : Differential equations with applications, 48 hours. — By Professor J. W. A. YOUNG : Introduction to the theory of numbers, 48 hours. — By Dr. A. C. LUNN : Analytic mechanics, 48 hours. — By Professor K. LAVES : Analytic mechanics, 96 hours. — By Professor F. R. MOULTON : Introduction to celestial mechanics, 96 hours ; Planetary perturbations, 96 hours.

HARVARD UNIVERSITY. — By Professor W. E. BYERLY : Differential and integral calculus (second course), three hours ; Trigonometric series, three hours (with Professor Peirce). — By Professor B. O. PEIRCE : Hydromechanics, three hours. — By Professor W. F. OSGOOD : Elements of mechanics, three hours ; Infinite series and products (first half year), three hours ; Theory of functions of a complex variable (second half year), three hours. — By Professor M. BÔCHER : Introduction to modern geometry and modern algebra, three hours ; Vector analysis and quaternions, three hours ; The properties of polynomials (first half year), three hours ; Definite integrals and integral equations (second half year), three hours. — by Professor C. L. BOUTON : Elementary theory of differential equations (second half year), three hours ; Geometric transformations, three hours. — By Professor J. K. WHITTEMORE : Theory of functions I, three hours ; Theory of the figure of the earth (second half year), three hours. — By Dr. J. L. COOLIDGE : Algebraic plane curves, three hours.

UNIVERSITY OF ILLINOIS.— By Professor S. W. SHATTUCK : Differential equations and calculus of variations, three hours. — By Professor E. J. TOWNSEND : Theory of functions, three hours ; Seminar, two hours. — By Professor G. A. MILLER : Theory of numbers, three hours ; Theory of determinants, two hours. — By Professor H. L. RIETZ : Theory of averages and actuarial theory, three hours. — By Professor J. STEBBINS : Method of least squares, two hours. — By Professor C. N. HASKINS : Solid analytic geometry, three hours ; Spherical harmonics and the potential function, three hours. — By Miss M. B. WHITE : Teacher's course, two hours. — By Dr. L. I. NEIKIRK : Theory of equations, three hours. — By Dr. C. H. SISAM : Modern geometry and algebraic surfaces, three hours. — By Dr. A. R. CRATHORNE : Partial differential equations, two hours.

INDIANA UNIVERSITY. — By Professor R. J. ALEY : Theory of numbers, two hours ; Differential equations, three hours (autumn, winter) ; Mathematical pedagogy, two hours (s) — By Professor S. C. DAVISSON : Modern analytic geometry, two hours (a, w) ; Theory of surfaces, two hours ; Non-euclidean geometry, two hours (w, s). — By Professor D. A. ROTHROCK : Advanced calculus, three hours ; Quaternions with applications, three hours (a, w) ; Potential functions, two hours (w, s). — By Professor U. S. HANNA : Substitution groups, three hours (a) ; Galois theory of equations, three hours (w). — By Dr. C. HASEMAN : Partial differential equations, three hours.

OXFORD UNIVERSITY (*Michaelmas Term*). — By Professor W. ESSON : Analytic geometry of plane curves, two hours ; Synthetic geometry of plane curves, one hour. — By Professor E. B. ELLIOTT : Sequences and series, two hours ; Elementary theory of numbers, one hour. — By Professor A. E. H. LOVE : Magnetism and electricity, three hours. — By Professor H. H. TURNER : Elementary mathematical astronomy, two hours. — By Mr. A. L. PEDDER : Problems in pure mathematics, one hour. — By Mr. J. E. CAMPBELL : Differential equations, two hours. — By Mr. C. H. THOMPSON : Integral calculus, two hours. — By Mr. E. H. HAYES : Analytic statics, two hours. — By Mr. A. L. DIXON : Hydrostatics, one hour. — By Mr. H. T. GERRANS : Tridimensional rigid dynamics, two hours. — By Mr. C. E. HASELFOOT : Theory of equations, one hour. — By Mr. P. J. KIRKBY : Projective geometry, two hours. — By

Mr. A. E. JOLLIFFE: Analytic geometry, two hours. — By Mr. J. W. RUSSELL: Differential calculus, two hours. — By Mr. R. F. McNEILE: Curve tracing, one hour. — By Mr. C. H. SAMPSON: Solid geometry, one hour.

UNIVERSITY OF BOLOGNA. — By Professor C. ARZELÀ: Lebesgue's integrals, Dirichlet's principle, Fourier's series, three hours. — By Professor L. DONATI: Electromagnetic fields and dynamics of electrons, three hours. — By Professor L. PINCHERLE: Analytic functions; algebraic functions and their integrals, three hours.

UNIVERSITY OF CATANIA. — By Professor G. LAURICELLA: Theory of heat and propagation of waves, four and a half hours. — By Professor G. PENNACCHIETTI: Advanced kinematics and rigid dynamics, four and a half hours. — By Professor M. PIERI: Projective geometry of hyperspace, three hours. — By Professor C. SEVERINI: Finite continuous groups of transformations, contact transformations, four and a half hours.

UNIVERSITY OF GENOA. — By Professor G. FUBINI: Existence theorems of the calculus of variations, three hours. — By Professor G. LORIA: Plane representation of algebraic surfaces, rational transformations of the plane and space, three hours. — By Professor O. TEDONE: Spherical functions, Lamé's functions with applications to electro- and magnetic statics, three hours.

UNIVERSITY OF MESSINA. — By Professor G. BAGNERA: Theta functions of several arguments and relative groups of characteristics, three hours. — By Professor R. MARCOLONGO: Electric and optical phenomena in moving media, three hours. — By Professor V. MARTINETTI: Projective geometry of hyperspace, three hours. — By Professor L. ORLANDO: Definite integrals with applications to mathematical physics, three hours; Principles of the theory of numbers, two hours. — By Professor G. VIVANTI: Calculus of variations, three hours.

UNIVERSITY OF NAPLES. — By Professor F. AMODÉO: History of mathematics during the last three centuries, three hours. — By Professor A. CAPELLI: Theory of groups with analytic applications, four and a half hours. — By Professor P. DELL PEZZO: Analytic functions, Riemann surfaces and automorphic functions, four and a half hours. — By Professor D. MONTESANO: Theory of hyperspaces and birational

transformation, four and a half hours. — By Professor L. PINTO : Physical optics, four and a half hours.

UNIVERSITY OF PADUA. — By Professor F. D'ARCAIS : Differential equations and theory of functions of a complex variable, four and a half hours. — By Professor A. FAVARO : History of Italian mathematics in the sixteenth and seventeenth centuries, three hours. — By Professor P. GAZZANIGA : Theory of numbers, three hours. — By Professor T. LEVI-CIVITA : Differential equations of dynamics; contact transformations with applications to dynamics and optics, four and a half hours. — By Professor G. RICCI : Theory of potential, electro- and magneto-statics, four hours. — By Professor F. SEVERI : Advanced theory of algebraic functions of one and two variables, three hours. — By Professor G. VERONESE : Geometry of hyperspace, four hours.

UNIVERSITY OF PALERMO. — By Professor F. GERBALDI : Differential geometry, four and a half hours. — By Professor G. B. GUCCIA : General theory of algebraic curves and surfaces, four and a half hours. — By Professor G. TORELLI : Mathematical theory of elasticity, four and a half hours. — By Professor A. VENTURI : Rotation of solid bodies, application to the earth, precession, nutation and motion of the pole, four and a half hours.

UNIVERSITY OF PAVIA. — By Professor E. ALMANI : Laplace's equation with applications to theoretical physics, three hours. — By Professor L. BERZOLARI : Algebraic forms with geometric applications, three hours. — By Professor E. PASCAL : Contact transformations with applications, three hours.

UNIVERSITY OF PISA. — By Professor E. BERTINI : Hyperspaces, geometry on an algebraic curve with applications, four and a half hours. — By Professor L. BIANCHI : Differential geometry of curves and surfaces, surfaces applicable to quadrics, four and a half hours. — By Professor U. DINI : Harmonic functions and Fourier's series, four hours. — By Professor G. A. MAGGI : Equilibrium and motion of elastic solid bodies, with applications to optics, four and a half hours. — By Professor P. PIZZETTI : General theory of planetary perturbations, three hours.

UNIVERSITY OF ROME. — By Professor G. BISCONCINI : Mathematical theory of elasticity, with technical applications,

three hours. — By Professor G. CASTELNUOVO: Geometry on an algebraic surface, three hours. — By Professor V. CERRUTI: Calculus of variations, with applications to geometry and mechanics, three hours. — By Professor V. VOLTERRA: Electromagnetic fields, four and a half hours: The problem of three bodies, three hours.

UNIVERSITY OF TURIN. — By Professor T. BOGGIO: Applications of Fredholm's integral equations to mathematical physics, three hours. — By Professor E. D'OVIDIO: Theory of algebraic forms, three hours. — By Professor G. MORERA: Newtonian forces, equilibrium of a rotating liquid, three hours. — By Professor C. SEGRE: Selected chapters of line geometry, three hours. — By Professor C. SOMIGLIANA: Propagation of heat, kinetic theory of gases, three hours.

WITH the aid of a gift from Mr. C. S. BARTON, Columbia University has secured a very extensive collection of mathematical models and instruments for a mathematical laboratory and museum.

IN Erlangen, on the twenty-seventh of April, the seventieth birthday of Professor PAUL GORDAN was appropriately celebrated by an elaborate programme, including numerous addresses from associates and collaborators. Professor Gordan will retire from active service at the close of the present semester.

PROFESSOR E. SELLING, of the University of Würzburg, has retired from active teaching.

MR. ARTHUR HOLDEN has been appointed assistant lecturer and tutor in mathematics at the University of Sheffield.

THE Accademia dei Lincei of Rome, has divided the royal prize of 10,000 lire for mathematics equally between Professor C. ARZELÀ, of the University of Bologna, and Professor G. CASTELNUOVO, of the University of Rome.

THE Italian scientific society has awarded its gold medal for researches in mathematics to Professor G. LAURICELLA, of the University of Catania.

MR. H. BATEMAN, lecturer in the University of Liverpool, has been appointed reader in mathematical physics at the University of Manchester. MR. J. E. LITTLEWOOD has been appointed lecturer in mathematics and MR. H. M. PRIESTLEY assistant lecturer in mathematics in the latter university.



AT the University of Michigan, Professor J. L. MARKLEY has been promoted to a full professorship of mathematics. Dr. P. FIELD, Dr. W. B. FORD and Dr. T. R. RUNNING have been promoted to assistant professorships of mathematics. Dr. J. W. GLOVER, professor of mathematics and insurance, has spent the past year, on leave of absence, as consulting actuary of the Wisconsin legislative committee on banks and insurance.

DR. C. C. GROVE, of Hamilton College, has been appointed professor of mathematics in Roanoke College.

AT the Massachusetts Institute of Technology, Professor F. H. BAILEY has been promoted to a full professorship of mathematics, and Mr. L. M. PASSANO to an assistant professorship.

PROFESSOR H. F. STECKER, of Pennsylvania State College, has been promoted to an associate professorship of mathematics.

AT Cornell University Mr. C. F. CRAIG and Dr. F. W. OWENS have been appointed instructors in mathematics.

AT the University of Illinois, Dr. A. R. CRATHORNE has been appointed instructor in mathematics, and Mr. H. P. KEAN, and Mr. W. W. DENTON assistants in mathematics. Dr. E. L. DODD has been appointed instructor in mathematics at the University of Texas.

DR. A. L. UNDERHILL, of Princeton University, has been appointed instructor in mathematics at the University of Wisconsin.

MR. JOSEPH LIPKE, of Columbia University, has been appointed instructor in mathematics at the University of California.

AT Vassar College, Miss E. MORENUS has been appointed instructor in mathematics; Miss G. SMITH has been granted a leave of absence and will spend next year in study at Paris.

DR. EDWARD JOHN ROUTH, the well-known mathematician of Cambridge, died June 7, 1907, at the age of 76 years. He was author of several works on dynamics and formerly lecturer of mathematics at Peterhouse and Pembroke Colleges.

PROFESSOR FRANCESCO SIACCI, senator of the kingdom of Italy and professor of theoretical mechanics at the University of Naples, died May 31, at the age of 68 years.