

precision found in exercise 5. Let  $M$  be a rational function of the  $n$  roots with coefficients in the domain  $\Omega$ . Let  $M$  be formally unaltered by the substitutions of a group  $Q$  and by no further substitutions on the  $n$  roots. If the conjugates of  $M$  under the symmetric group are all numerically distinct and if  $M$  is a number in  $\Omega$ , the Galois group for the domain  $\Omega$  is either  $Q$  or one of its subgroups.

The text furnishes interesting applications to cyclotomic equations; geometric constructions by ruler and compass, in particular to the possible divisions of the circle into equal parts; the duplication of the cube; the trisection of an angle.

L. E. DICKSON.

*Annuaire Astronomique pour 1905.* Hayez, Brussels, 1904. 16mo. 360 pp.

THIS handy little volume, published annually under the auspices of the Royal Belgian Observatory, would perhaps scarcely be a suitable subject for notice in these columns if the Society did not contain amongst its members many who in addition to their mathematical duties have charge of observatories in which research work is necessarily entirely subordinate to instruction. For such it will be found useful to have on the table, along with the Nautical Almanac, its contents including besides the usual astronomical data, formulæ for finding the various terms in use, full explanations of the tables, worked examples, etc. It is published primarily to aid in the administration of the Belgian public service, to give assistance and information to all interested in astronomy, and to popularize the study of the subject. From the way in which it is written and put together it would appear to be successful in achieving these objects.

ERNEST W. BROWN.

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#### NOTES.

THE annual meeting of the AMERICAN MATHEMATICAL SOCIETY will be held on Thursday and Friday, December 29–30. The Council will meet on Thursday morning, and the annual election of officers and other members of the Council will close on Friday morning. At the opening of the afternoon session on Thursday, the retiring President, Professor THOMAS S. FISKE, will deliver the presidential address, the subject of which will be “Mathematical progress in America.”

THE Christmas meeting of the Chicago Section of the AMERICAN MATHEMATICAL SOCIETY will be held on Friday and Saturday, December 30 and 31, at the Northwestern University building (corner of Lake and Dearborn streets). Titles and abstracts of papers to be presented at this meeting should be in the hands of the Secretary of the Section, Professor THOMAS F. HOLGATE, 617 Hamline Street, Evanston, Ill., not later than December 8.

THE concluding (October) number of volume 5 of the *Transactions of the American Mathematical Society* contains: "On a method of dealing with the intersections of plane curves," by F. S. MACAULAY; "On certain complete systems of quaternion expressions, and on the removal of metric limitations from the calculus of quaternions," by J. M. PEIRCE; "Three particular systems of lines on a surface," by L. P. EISENHART; "On ruled surfaces whose flecnodal curve intersects every generator in two coincident points," by E. J. WILCZYNSKI; "On the automorphic functions of the group  $(0, 3; 2, 6, 6)$ ," by J. I. HUTCHINSON; "A theorem concerning the invariants of linear homogeneous groups, with some applications to substitution groups," by H. F. BLICHFELDT; "On the geometry whose element is the 3-point of a plane," by F. MORLEY; "Sufficient condition for a minimum with respect to one-sided variations," by G. A. BLISS; "Sur les opérations linéaires," by M. FRÉCHET; "On groups in which certain commutative operations are conjugate," by H. L. RIETZ; "On hypercomplex number systems (first paper)," by H. TABER; Notes and errata, volumes 1, 3, 4, 5; Table of contents, volume 5; Indices, volumes 1-5, by subject matter, by authors, by numbers.

THE list, recently published in the BULLETIN (pages 28-29), of American doctorates in mathematics conferred during the last academic year, with titles of dissertations, should have included: E. L. DODD, Yale, "On multiple sequences"; H. E. JORDAN, Chicago, "Group characters of various types of linear groups."

THE autumn meeting of the National academy of sciences was held at Columbia University, November 15-16. The following mathematical papers were presented: "The system of magnetic forces causing the secular variation of the earth's magnetism," by L. A. BAUER; "On topical geometry," by C.

S. PEIRCE; "The absolute value of the acceleration of gravity determined by the ring-pendulum method," by C. E. MENDENHALL; "The double suspension pendulum for measuring the acceleration of gravity," by R. S. WOODWARD.

AT a meeting held at Teachers College, Columbia University, Saturday, November 5, the New York Section of the Association of teachers of mathematics in the middle states and Maryland was organized. Professor G. LEGRAS, of the College of the City of New York, was elected chairman, and Miss CHARLOTTE SMITH of the Girls' High School of Brooklyn, secretary. The following papers were read: "The genesis of geometric concepts," by Professor C. J. KEYSER; "The teaching of algebra," by Professor J. H. TANNER.

A meeting of the Association of mathematical teachers in New England was held on November 19 at Harvard University. The program of the meeting was as follows: "An explanation of the new definitions of entrance requirements in mathematics; the reasons for the changes; the practical effects of the changes upon the teaching in the schools," the speakers being Professor H. W. TYLER, Mr. F. B. KNAPP, and Professor W. F. OSGOOD; "Some calculating machines and the slide rule," by Professor LOUIS DERR. The following officers were elected for the ensuing year: president, Mr. W. A. FRANCIS; vice-president, Professor N. F. DAVIS; secretary, Mr. G. W. EVANS.

THE Kansas association of mathematics teachers will meet at Topeka, December 28-29, in connection with the State teachers association. The opening address, by President H. B. NEWSON, will be on the subject of "High school mathematics from the standpoint of the college.

THE fifty-fourth annual meeting of the American association for the advancement of science will be held at Philadelphia, December 27-31, under the presidency of Professor W. G. FARLOW, of Harvard University. Professor A. ZIWET is vice-president and chairman of section A (mathematics and astronomy), and Professor L. G. WELD is secretary. The retiring vice-presidential address will be delivered by Mr. O. H. TITTMAN, superintendent of the coast and geodetic survey.

AMONG the new books which are in the press of J. Wiley and Son may be mentioned: An introduction to the differential

calculus, based on the method of rates, by W. W. JOHNSON ; Projective geometry with applications, by A. EMCH.

THE first part of volume 1 of the French edition of the Encyclopedia of mathematics has just appeared from the presses of B. G. Teubner and Gauthier-Villars. Several other parts are in the press and arrangements have been made to publish subsequent parts as soon as possible. Members of the Deutsche Mathematiker-Vereinigung are allowed the same special price as in case of the German edition. Persons interested should communicate with Professor Dr. A. Krazer, Karlsruhe in Baden, Westendstrasse 57.

UNIVERSITY OF PARIS.—Following the affiliation with the Ecole Normale, an additional course in mathematics is announced for the present semester (compare BULLETIN, volume 10, page 520):—by Professor F. RAFFY: Applications of analysis to geometry, two hours.—A mathematical conference will be held by Professor E. GOURSAT: Applications of differential calculus to geometry:—The courses of Professors Tannery, Raffy and Borel, formerly given in the Ecole Normale, have been discontinued.

AN INTERNATIONAL prize for geometry will be awarded by the Circolo Matematico di Palermo on the occasion of the fourth international congress of mathematicians, which will be held at Rome in the year 1908. The prize, which will be styled the Guccia Medal in honour of its founder, will consist of a gold medallion and a sum of 3000 francs.

It is well known that, since the papers which were published in connection with the competition for the Steiner Prize in 1882, the theory of algebraic twisted curves has been somewhat neglected, and has not shared in the remarkable progress in geometry, which has been achieved by synthetical and algebraical methods as well as by those of the theory of functions. The result has been that neither the fundamental questions which were raised in the papers referred to, nor others which might have been propounded, have been the subjects of further investigations ; and, on passing from ordinary space to space of higher dimensions, one finds a number of important problems connected with algebraic curves (especially those bearing on their classification, the study of canonical curves of given deficiency etc.) to which no attention has yet been devoted.

On the other hand but few theorems in which there is a limitation either to a real field or to a given domain of rationality are known with respect to algebraic twisted curves.

The Guccia medal is offered for "A memoir making an important advance in the theory of algebraic twisted curves." No other conditions are prescribed either as to the methods of research or as to the problems to be investigated. If none of the memoirs on the given subject is declared worthy of the prize, this may be awarded for "A memoir making an important advance in the theory of algebraic surfaces or of other algebraic manifolds."

Memoirs submitted for the competition must not have been previously published. They must be in one of the languages, Italian, French, German, or English, and type-written (except the formulæ); and three copies, inscribed with a motto, must reach the president of the Circolo Matematico di Palermo before July 1, 1907. They must be accompanied by a sealed envelope, bearing the motto and containing the name and address of the author. The memoir to which the prize is adjudged will be printed in the *Rendiconti* or in some other publication of the Circolo Matematico di Palermo. The author will receive 200 copies free of charge. If the prize is not adjudged to any of the memoirs submitted, it may be given for a published work on the theories previously mentioned, provided that this shall have appeared after the issue of the present notice and before July 1, 1907.

The prize will be awarded according to the decision of an International Commission composed of M. NOETHER, H. POINCARÉ, and C. SEGRE. The report of the Commission will be read and the prize conferred upon the successful competitor at one of the sessions of the fourth international congress of mathematicians at Rome in the year 1908.

PROFESSOR L. RAFFY has been appointed professor of differential geometry at the University of Paris.

PROFESSOR A. COTTON has been appointed professor of mechanics at the University of Grenoble.

PROFESSOR E. CARTAN has been appointed professor of the calculus at the University of Nancy.

PROFESSOR J. DRACH has been appointed professor of rational mechanics at the University of Poitiers.

MR. H. M. MACDONALD has been appointed professor of mathematics at the University of Aberdeen.

DR. O. EGGERT, of the University of Berlin, has been appointed professor of geodesy in the technical school at Danzig.

AT the Ecole Polytechnique, of Paris, Professor H. POINCARÉ has been appointed professor of general astronomy, as successor to the late Professor Callandreau. Professor LECORNU has been appointed professor of mechanics, as successor to the late Professor Sarrau.

AT the University of Lausanne, Professor H. JOLY has been promoted to a full professorship of mathematics, and Professor A. DOMMER has been promoted to a full professorship of mechanics.

PROFESSOR S. NEWCOMB has been elected a corresponding member of the Vienna academy of sciences.

PROFESSOR P. MANSION, of the University of Ghent, C. A. LAISANT, of the Ecole Polytechnique, and G. PEANO, of the University of Turin, have been elected honorary members of the Physico-mathematical society of Kasan.

THE following have been appointed examiners in the Cambridge mathematical tripos for 1905: Messrs. R. R. WEBB (St. John's), G. H. A. WILSON (Clare), J. M. DODDS (Peterhouse), E. W. BARNES (Trinity).

MR. A. YOUNG has been elected fellow in mathematics of Clare College, Cambridge.

PROFESSOR F. S. LUTHER, professor of mathematics in Trinity College, of Hartford, Conn., was installed as president of the institution October 28.

AT the University of Illinois Dr. J. STEBBINS has been promoted to an assistant professorship of astronomy. Mr. A. H. WILSON, formerly of Princeton University, has been appointed instructor in mathematics.

DR. H. B. EVANS has returned to the University of Pennsylvania after two years' absence; he has been appointed assistant professor of mathematics.

THE following appointments have been made at the University of Maine: Mr. C. P. WESTON, assistant professor of me-

chanics; Mr. H. R. WILLARD, instructor in mathematics; Mr. R. K. MORLEY, tutor in mathematics.

AT Oberlin College, Professor F. ANDEREGG has returned after a year's absence abroad; Mr. W. D. CAIRNS has been promoted to an associate professorship of mathematics; and Mr. J. R. LUCKEY has been appointed assistant in mathematics and physics.

MR. E. D. GRANT, instructor in mathematics at the Michigan College of Mines, has been promoted to an associate professorship.

DR. K. SCHMIDT has been appointed professor of mathematics and astronomy at the newly organized University of Florida, at Lake City, Florida.

THE College entrance examination board of the middle states and Maryland has reappointed the examiners in mathematics who served in 1904, namely Professor F. N. COLE, Professor T. C. ESTY, and Dr. ARTHUR SCHULTZE.

PROFESSOR H. KORTUM, of the University of Bonn, died September 24, at the age of 68 years. Professor G. LILLEY, of the University of Oregon, died June 8, aged 68 years. Professor K. EDLER VON OTT, of the German technical school at Prague, died August 23, at the age of 69 years.

RECENT catalogues of second-hand mathematical works: Librairie H. Welter, rue Bernard-Palissy 4, Paris, clearance sale of mathematical and physical works, about 1,200 titles; A. Buchholz, Ludwigstrasse 7, Munich, Antiquariats-Katalog 41, 296 titles in mathematics; Jacques Rosenthal, Karlstrasse 10, Munich, Katalog 26, 377 titles in mathematics; H. Lüneburg, Karlstrasse 4, Munich, Antiquariats-Katalog 54, Mathematik, 1,165 titles.

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## NEW PUBLICATIONS.

### I. HIGHER MATHEMATICS.

BOLZA (O.). Lectures on the calculus of variations. Chicago, University of Chicago Press, 1904. 8vo. 16 + 271 pp. Cloth. \$4.00