

The rest of the discussion is in the main quite different. I proved a theorem concerning the order of abelian groups contained by non-abelian groups of three times their order which is similar to his, but made no use of it in the determination of the groups in the ordinary plane. He arrived at the G_{168} and the G_{360} as the result of the solution of a diophantine equation (the same, in fact, as was used by Jordan in his attack on the problem, *Crelle*, 1878), whereas I arrived at them from the consideration of groups which left conics invariant. I however made use of a special type of this equation in two or three places.

H. H. MITCHELL.

NOTES.

THE annual meeting of the AMERICAN MATHEMATICAL SOCIETY will be held in New York on December 27-28. The winter meeting of the Chicago Section will be held at the University of Chicago on December 29-30. Titles and abstracts of papers to be presented at these meetings should be in the hands of the respective secretaries by December 9. Abstracts intended to be printed in advance of the meeting should be sent in as early as possible.

THE Annual Register of the Society is now in preparation and will be issued in January. Blanks for furnishing necessary information have been sent to the members. Early notice of any changes since the issue of the last Register will greatly facilitate the work of the Secretary. The Register is widely circulated and it is desirable that the information which it contains should be accurate and reliable.

THE concluding (October) number of volume 12 of the *Transactions of the American Mathematical Society* contains the following papers: "On the limit of the degree of primitive groups," by W. A. MANNING; "Isomorphisms of a group whose order is a power of a prime," by G. A. MILLER; "On minimal lines and congruences in four-dimensional space," by J. EIESLAND; "Volterra's integral equation of the second kind, with discontinuous kernel. Second paper," by G. C. EVANS; "One-parameter families and nets of plane curves," by E. J. WILCZYNSKI; Notes and errata, volumes 10 and 11.

THE opening (September) number of volume 13 of the *Annals of Mathematics* contains: "A method of solving linear differential equations." Second paper, by P. A. LAMBERT; "Duality in projective geometry," by N. J. LENNES; "A fundamental parametric representation of space curves," by L. P. EISENHART; "Generalization in the theory of numbers and theory of linear groups," by MILDRED SANDERSON; "Transformations of series by means of functions admitting a recurrent relation," by W. C. BRENKE; "A theorem on (m, n) correspondences," by L. I. NEIKIRK. With the present volume, the *Annals* appears in a new dress, with narrower margins and a change in style of type. The editors are Ormond Stone, Maxime Bôcher, G. D. Birkhoff, L. P. Eisenhart, Elijah Swift, Oswald Veblen, and J. H. Maclagan-Wedderburn.

THE first number has appeared of the *Tôhoku Mathematical Journal*, edited by Professor T. HAYASHI of the Imperial University, Sendai, Japan, with the cooperation of M. Fujiwara, F. Ishiwara, T. Kubota, and K. Ogura.

THE Italian society for the advancement of science held its annual session in Rome during the week October 12-18. As this is the fiftieth year of Italian independence, it seemed appropriate to give a summary of the progress made in science by Italians during the last fifty years. The following reports were made in pure and applied mathematics: "Astronomy," by E. BIANCHI; "Geodesy," by V. REINA; "Theory of functions and integral equations," by G. LAURICELLA; "Geometry," by U. AMALDI; "Mathematical physics," by T. LEVI-CIVITA; "Electricity," by M. O. CORBINO. The following general lectures were also delivered: "Evolution of the measurement of space and time," by G. CASTELNUOVO; "The new physics," by A. RIGHI; "Science in the far east," by G. VACCA; "On algebra of logic and some transcendents," by G. ANDREOLI; "Historical and critical note on the principles of mechanics," by R. GIACOMELLI.

THE sum of 20,000 rupees (nearly \$7000.00) was recently appropriated by the University of Calcutta for the purpose of publishing certain ancient Indian mathematical manuscripts with an English translation.

GINN and Company announce the early appearance of a work on Advanced Calculus, by Professor E. B. WILSON, of the Massachusetts Institute of Technology.

THE reports of the American committees and subcommittees of the International commission on the teaching of mathematics are being published by the U. S. Bureau of Education, from which copies may be obtained gratis on application. The following reports have already appeared: Graduate work in mathematics in universities and in other institutions of like grade in the United States. Undergraduate work in mathematics in colleges of liberal arts and universities. Examinations in mathematics other than those set by the teacher for his own classes. Mathematics in the technological schools of collegiate grade in the United States. Training of teachers of elementary and secondary mathematics.

UNIVERSITY OF PARIS. The following mathematical courses are announced for the semester beginning November 3, 1911:—By Professor G. DARBOUX: Differential geometry, quadratic differential forms, applications of the calculus of variations, two hours.—By Professor E. GOURSAT: Differential and integral calculus, elements of the theory of analytic functions, two hours.—By Professor E. BOREL: Elliptic functions, one hour.—By Professor P. APPELL and M. CL. GUICHARD: General laws of equilibrium and motion, two hours.—By MM. E. CARTAN and MONTEL: General mathematics, first part, two hours.—By Professor H. POINCARÉ: Theory of newtonian potential and its applications to the figure of planets, two hours.—By Professor J. BOUSSINESQ: Mathematical theory of elasticity of solid bodies, two hours.—By M. A. CAHEN: Indeterminate analysis of the second degree with two unknowns, quadratic forms and algebraic numbers, two hours.

Conferences will be conducted by MM. LEBESGUE, GUICHARD, CARTAN, MONTEL, SERVANT, and ROUBAUDI.

In the Ecole Normale. By Professor E. VESSIOT: Differential and integral calculus.—By Professor E. BOREL: Theory of functions.

In the second semester, beginning March 1, the following courses are announced:—By Professor E. PICARD: Fourier's series and its generalizations.—By Professor E. GOURSAT: Ordinary and partial differential equations.—By Professor P. APPELL: General laws of motion of systems, analytic mechanics, hydrostatics and hydrodynamics.—By M. E. CARTAN: Analysis and mechanics.—By ———: Indeterminate analysis of the second degree.

In the Ecole Normale the courses of Professors Vessiot and Borel are continued from the first semester and there is added: By Professor J. HADAMARD: Mathematics.

THE following courses in mathematics are announced at the German technical schools (and at Delft, Holland) during the present winter semester. The course designated as "higher mathematics" refers to a combination of algebra, analytic geometry, differential and integral calculus, continuing for from two to four semesters I, II, etc.

AACHEN.—By Professor O. BLUMENTHAL: Higher mathematics, II, six hours; Theory of aviation, four hours.—By Professor E. KÖTTER: Descriptive geometry, six hours; Graphical statics, three hours.—By Professor K. REISSNER: Mechanics, I and II, four hours; Aerodynamics, four hours.

BERLIN.—By Professor G. HETTNER: Differential and integral calculus, six hours; with exercises, two hours; Differential equations, two hours.—By Professor F. HAENTZSCHEL: Elements of the calculus, with exercises, six hours; Elements of mechanics, four hours.—By Professor O. KRIGAR-MENZEL: General mechanics, four hours; Advanced mechanics, four hours.—By Professor E. JOLLES: Descriptive geometry, I, six hours; Descriptive geometry, II, six hours.—By Professor E. LAMPE: Calculus, with exercises, six hours.; Definite integrals, four hours.—By Professor G. SCHEFFERS: Descriptive geometry, I and II, each six hours.—By Professor G. WALLENBERG: Selected chapters of elementary mathematics, two hours; Theory of functions, two hours; Theory of potential, two hours.—By Professor E. SALKOWSKY: Descriptive geometry, six hours.—By Dr. L. LICHTENSTEIN: Integral equations, six hours.—By Dr. R. FUCHS: Differential equations, two hours.—By Dr. K. v. IGNATOWSKY: Vector analysis, two hours.

BRESLAU.—By Professor C. CARATHÉODORY: Higher mathematics, four hours; Selected chapters in analysis, two hours; Mathematics for chemists and mining engineers, three hours.—By Professor G. HESSENBERG: Descriptive geometry, with exercises, eight hours; Selected chapters in geometry, three hours.—By Professor E. STEINITZ: Higher mathematics, III, with exercises, eight hours.

BRUNSWICK.—By Professor R. DEDEKIND: Elements of the theory of numbers, four hours; Introduction to the theory of

probabilities.—By Professor R. FRICKE: Analytic geometry and algebra, five hours; Differential and integral calculus, four hours; Selected chapters in the theory of functions, three hours.—By Professor H. E. TIMERDING: Descriptive geometry, six hours; Introduction to higher analysis, four hours; Theory of surfaces and space curves, three hours.—By Dr. K. WITTE: Analytic mechanics, four hours.

DANZIG.—By Professor H. LORENZ: Dynamics of a rigid body, four hours; Elasticity, two hours.—By Professor H. v. MANGOLDT: Higher mathematics, five hours; Seminar, two hours.—By Professor F. SCHILLING: Descriptive geometry, with exercises, eight hours; Perspective and photogrammetry, one hour.—By Professor J. SOMMER: Higher mathematics, six hours; Seminar (with Professor v. Mangoldt) two hours.

DARMSTADT.—By Professor F. DINGELDEY: Higher mathematics, six hours; Theory of attraction, two hours.—By Professor F. GRAEFE: Repetitorium of elementary mathematics, three hours; Higher mathematics, five hours; History of mathematics, one hour.—By Professor J. HORN: Higher mathematics, I and II, each five hours.—By Professor R. MÜLLER: Descriptive geometry, eight hours.—By Professor H. WIENER: Descriptive geometry, eight hours; Foundations of elementary geometry, two hours.

DELFT.—By Professor J. A. BARRAU: Determinants and introduction to the calculus, three hours; Elements of projection two hours; Curved lines and surfaces, two hours; Line geometry, one hour.—By Professor W. H. L. JANSSEN v. RAAJ: Advanced analytics and foundations of the calculus, five hours; Advanced calculus, four hours.—By Professor W. A. VERSLUYS: Plane analytic geometry, two hours; Geometry of space, two hours; Theory of equilibrium and of motion, two hours.—By Professor J. CARDINAAL: Descriptive geometry, two hours; Application to space curves and surfaces, two hours; Kinematics, three hours.—By Dr. G. SCHOUTEN: Geometry of motion, two hours; Moments of inertia and dynamics of a particle, two hours; Theory of the gyroscope, one hour.

DRESDEN.—By Professor G. HELM: Higher mathematics, five hours; Mathematical physics, three hours; Theory of the potential, three hours.—By Professor M. KRAUSE: Higher mathematics, five hours; Analytic functions, three hours;

Seminar, two hours.—By Professor L. LUDWIG: Descriptive geometry, six hours; Theory of perspective, two hours; Space curves, two hours.—By Professor E. NAETSCH: Analytic geometry of quadric surfaces, four hours; Elementary algebra and analysis, two hours.—By Dr. L. HEGER: Plane cubic curves, three hours.

HANOVER.—By Professor L. KIEPERT: Higher mathematics, I, eight hours; Higher mathematics, III, two hours; Calculus of variations, two hours.—By Professor F. MÜLLER: Higher mathematics, II, eight hours; Vector analysis, two hours.—By Professor K. WIEGHARDT: Foundations of higher mathematics, four hours; Elasticity, four hours; Differential equations, one hour.—By Professor K. RODENBURG: Descriptive geometry, nine hours.—By Dr. L. PETZOLD: Algebra and trigonometry, three hours.

KARLSRUHE.—By Professor M. DISTEL: Descriptive geometry, four hours; with exercises, four hours; Graphical statics, two hours; with exercises, two hours.—By Professor K. HEUN: Mechanics, with exercises, six hours; Seminar, three hours.—By Professor A. KRAZER: Higher mathematics, I (algebra and analytic geometry), with exercises, eight hours.—By Professor P. STÄCKEL: Higher mathematics, II (differential and integral calculus), three hours; Partial differential equations, two hours.—By Dr. H. MOHRMANN: Exercises in fundamental principles of mathematics, two hours; Arithmetic and algebra, with exercises, three hours; Trigonometry, with exercises three hours.—By Dr. W. VOGT: Analytic geometry, with exercises, three hours; Projective geometry, three hours.—By —: Elements of mechanics, with exercises, three hours.

STUTTGART.—By Professor R. MEHMKE: Descriptive geometry, six hours; Graphical methods, three hours.—By Professor L. KOMMERELL: Foundations of geometry, four hours.—By Professor E. WÖLFFING: Theory of functions, I, four hours.—By Professor G. FABER: Higher mathematics, II, six hours; Differential and integral calculus, with exercises, four hours.—By Dr. F. HALLER: Plane and spherical trigonometry, four hours.

PROFESSOR E. W. BROWN, of Yale University, has been elected an honorary fellow of Christ's College, Cambridge, England.

PROFESSOR F. LONDON, of the University of Bonn, has been promoted to a full professorship of mathematics.

PROFESSOR F. ENGEL, of the University of Greifswald, has been decorated with the order of the red eagle of the fourth class.

PROFESSOR E. STUDY, of the University of Bonn, has been elected to membership in the Göttingen academy of sciences.

PROFESSOR N. HATZIDAKIS, of the University of Athens, has been elected a member of the Vienna academy of sciences. Professor D. HILBERT, of the University of Göttingen, has been elected a corresponding member.

PROFESSOR PH. FURTWÄNGLER, of the agricultural academy of Poppelsdorf, has accepted a full professorship of mathematics at the University of Vienna.

DR. R. BÖHM has been appointed docent in mathematics at the University of Munich.

DR. J. L. JONES has been appointed instructor in mathematics at Yale University.

PROFESSOR L. G. WELD, until recently head of the department of mathematics and dean of the faculty of arts of Iowa State University, has been appointed director of the Pullman Free School of Manual Training to be established at Pullman, Ill.

PROFESSOR GEORGE W. JONES, of Cornell University, died October 29, at the age of 74 years. He retired as professor emeritus under the Carnegie foundation in 1907, after 45 years of teaching, the last 31 of which were spent at Cornell.

RECENT catalogues of second-hand books:—Heinrich Kerler, Ulm a. Donau, Antiquariats-Katalog 397, 2377 titles in pure and applied mathematics.—W. Heffer and Sons, Cambridge, England, catalogue 83, 2141 titles in mathematics, physics, and astronomy; also catalogue 81, 4507 titles of which 927 are school and college text-books in mathematics.—W. Junk, Kurfürstendamm 201, Berlin, bulletin 9, 2700 titles in exact sciences.—Ferdinand Schöningk, Osnabrück, catalogue 125, 1865 titles in mathematics and sciences.—J. Schweitzer, Lenbachplatz 1, Munich, catalogue 54, insurance, 2337 titles.