

33. The paper of Professor Moulton is devoted to the consideration of a class of periodic orbits in which the mean motion of the line of nodes of the orbit of one the bodies, referred to the mean plane of the motion of the other two, is arbitrary except for the condition that it shall be commensurable with the synodic mean motion of the three bodies. The discussion involves a new treatment of Hill's linear differential equation with periodic coefficients.

As applied to the lunar theory, the paper shows how to construct expressions for the coordinates of a body having the same synodical period and mean rate of revolution of the line of nodes as observations show the moon has. These are the terms which are said to depend upon the mean motions of the sun and moon, the parallax of the moon, and the latitude of the moon.

34. Professor Bolza's paper gives an extension of Weierstrass's theorem on the expression of the total variation by means of the E-function and of Kneser's theorem on transversals to the so-called most general case of an extremum of a simple definite integral, in which it is required to minimize an integral of the form

$$I = \int_{x_0}^{x_1} f(x, y_1, \dots, y_n; y'_1, \dots, y'_n) dx$$

involving n unknown functions y_1, \dots, y_n of x and their first partial derivatives y'_1, \dots, y'_n , connected by $r < n$ differential equations $f_\rho(x, y_1, \dots, y_n; y'_1, \dots, y'_n) = 0$ ($\rho = 1, 2, \dots, r$).

F. N. COLE,
Secretary.

THE NEW HAVEN COLLOQUIUM.

THE Fifth Colloquium of the AMERICAN MATHEMATICAL SOCIETY was held, at the close of the thirteenth summer meeting, at Yale University, New Haven, Conn., opening on Wednesday morning, September 5, 1906 and extending until noon of the following Saturday. Since the colloquium has become a highly important element in the Society's activities, an outline of its historic development may here be of interest.

The first colloquium organized by the Society was held in connection with the third summer meeting at Buffalo, N. Y., September 2-5, 1896. Two courses of six lectures each were delivered before an audience of thirteen members. Professor Maxime Bôcher considered "Linear differential equations and their applications," and Professor James Pierpont discussed "The Galois theory of equations."*

The second colloquium was held at the close of the fifth summer meeting, at Cambridge, Mass., August 22-27, 1898, before twenty-six persons. Professor W. F. Osgood delivered six lectures on "Selected topics in the general theory of functions," and Professor A. G. Webster six lectures on "The partial differential equations connected with wave propagation."†

The third colloquium, held in connection with the eighth summer meeting, at Ithaca, N. Y., August 21-24, 1901, was attended by twenty-five persons. Two courses of four lectures each were delivered: by Professor Oskar Bolza on "The simplest type of problems in the calculus of variations," and by Professor E. W. Brown on "Modern methods of treating dynamical problems and in particular the problem of three bodies."‡

The fourth colloquium was held immediately after the tenth summer meeting at Boston, Mass., September 2-5, 1903, before an audience of thirty-one members. Three courses of lectures were given: by Professor E. B. Van Vleck, "Selected topics in the theory of divergent series and continued fractions," six lectures; Professor H. S. White, "Linear systems of curves on algebraic surfaces," three lectures; Professor F. S. Woods, "The connectivity of non-euclidean space," three lectures.§

* See the report by Professor T. S. Fiske, BULLETIN, series 2, volume 3, pages 49-59. Professor Bôcher's lectures were published in part in the *Annals of Mathematics*, series 1, volume 12 (1898), pages 45-53. Professor Pierpont's lectures were published in the same journal, series 2, volume 1 (1899), pages 113-143 and volume 2 (1900), pages 22-56.

† See the report by Professor H. S. White, BULLETIN, volume 5, pages 57-58. Professor Osgood's lectures were published in the same volume, pages 59-87. The lectures of Professor Webster are to be published soon.

‡ See the report by Professor Edward Kasner, BULLETIN, volume 8, pages 22-25. Professor Bolza's lectures are embodied in his *Lectures on the Calculus of Variations*, University of Chicago Decennial Publications, No. 14. An abstract of Professor Brown's lectures was published in the BULLETIN, volume 8, pages 103-113.

§ See the report by Professor F. N. Cole, BULLETIN, volume 10, pages 119-120, and an abstract of Professor White's lectures immediately following. All the courses have since been published for the Society by the Macmillan Company under the title *The Boston Colloquium*. This book is reviewed by Professor J. I. Hutchinson in the present number of the BULLETIN.

At the December meeting 1905, the Council appointed a committee consisting of Professors J. Pierpont, P. F. Smith, H. Maschke, H. S. White and F. N. Cole to arrange for a fifth colloquium. A preliminary circular announcing the general features was issued in June. The colloquium opened on Wednesday morning, September 5, 1906, in the lecture rooms of Lampson Hall, Yale University, the following 43 persons being in attendance:

Mr. G. D. Birkhoff, Professor G. A. Bliss, Professor E. W. Brown, Dr. A. B. Chace, Dr. J. E. Clarke, Dr. A. Cohen, Mr. H. H. Conover, Professor D. R. Curtiss, Mr. H. N. Davis, Professor L. P. Eisenhart, Professor W. B. Fite, Professor A. S. Gale, Professor C. N. Haskins, Dr. L. I. Hewes, Professor Edward Kasner, Professor O. D. Kellogg, Dr. W. R. Longley, Mr. E. B. Lytle, Professor James McMahan, Professor T. E. McKinney, Professor H. P. Manning, Professor Max Mason, Mr. E. A. Miller, Professor E. H. Moore, Professor James Pierpont, Professor H. L. Rietz, Dr. R. G. D. Richardson, Miss S. F. Richardson, Mr. A. R. Schweitzer, Miss I. M. Schottenfels, Professor C. S. Slichter, Dr. Clara E. Smith, Professor P. F. Smith, Professor Virgil Snyder, Professor H. F. Stecker, Dr. R. P. Stephens, Professor W. E. Story, Professor E. B. Van Vleck, Professor A. G. Webster, Professor H. S. White, Professor E. J. Wilczynski, Professor T. W. D. Worthen, Professor J. W. Young.

Three courses of lectures were given, as follows:

Professor E. H. MOORE: "On the theory of bilinear functional operations." Five lectures.

Professor E. J. WILCZYNSKI: "Projective differential geometry." Four lectures.

Professor MAX MASON: "Selected topics in the theory of boundary value problems of differential equations." Four lectures.

Two lectures were given each morning, two on each of the afternoons of Wednesday and Friday, and one on Wednesday evening, the lecturers alternating. Printed syllabi of all the courses had been issued in advance, which greatly aided intelligent participation. Thursday afternoon was devoted to a trip on Long Island Sound; in the evening the members dined together at Momauguin. The remaining evenings were devoted to social conference at the Graduate Club, whose privileges were extended to members of the Society. The hospitality of the Club,

of Yale University, and particularly of the members of the mathematical department were gratefully acknowledged by a unanimous vote of thanks and appreciation at the closing meeting.

Detailed reports of the courses, prepared by the lecturers, will appear in later numbers of the BULLETIN.

VIRGIL SNYDER.

THEORY AND CONSTRUCTION OF TABLES FOR THE RAPID DETERMINATION OF THE PRIME FACTORS OF A NUMBER.*

BY PROFESSOR ERNEST LEBON.

By making use of some hitherto unnoticed properties of certain arithmetic progressions, I have succeeded in constructing a table giving very rapidly the solution of the following double problem: *To determine whether a given number is prime or composite, and in the latter case to find its prime factors.* The process which I employ is applicable to large numbers.†

1. Let B be the product $\alpha\beta \dots \lambda$ of the consecutive prime numbers $\alpha, \beta, \dots, \lambda$, beginning with 2; P the product $(\alpha - 1)(\beta - 1) \dots (\lambda - 1)$; I any of the P numbers that are relatively prime to B and less than B ; K a number successively equal to the positive integers, starting from zero.

We easily see that *the system of P arithmetic progressions whose general term is $BK + I$ contains all the prime numbers except those that occur in B .*

We shall say that B is the base of the system and that I is the index of a term of this system.

Two indices will be said to be complementary when their sum is equal to the base.

2. Let N, D and M be any numbers relatively prime to B . In order to avoid ambiguity, I will write D in the form $BK' + I'$.

It is evident that $N(= BK + I)$ is or is not divisible by D according as K and M do or do not satisfy the equation

* Translated by Professor W. B. FITE.

† Cf. *Comptes rendus*, vol. 151 (1905), p. 78. See also § 10, p. 77.