THE FORTY-SIXTH REGULAR MEETING OF THE SAN FRANCISCO SECTION

The forty-sixth regular meeting of the San Francisco Section of the Society was held at the University of Oregon on Friday, June 19, 1925. Professor E. R. Hedrick presided and Professor W. E. Milne acted as Secretary. The total attendance was eighteen, including the following fourteen members of the Society:

Bernstein, A. F. Carpenter, De Cou, Dederick, Eells, E. R. Hedrick, Kent, Lehmer, W. E. Milne, Neikirk, Moritz, Robertson, Smail, Winger.

It was decided to hold the next Northwest meeting of the Section at the University of Washington on a date to be determined later.

The visiting members and their families were generously entertained by the University of Oregon members on the day of the meeting and on the day following.

Titles and abstracts of papers read at the meeting follow. The papers of Bell, Cajori, Cramlet, and Stager were read by title.

1. Professor E. T. Bell: *On the representations of integers as sums or differences of two positive integer cubes.*

This paper appeared in the July number of this BULLETIN.

2. Professor E. T. Bell: *Generalizations of the eight-square and similar identities.*

A generalization for the eight-square identity similar to that of Lagrange for the four-square is given; and it is shown that the corresponding norm theorems for algebraic numbers can be similarly generalized. This paper will appear in the ANNALS OF MATHEMATICS.

3. Professor B. A. Bernstein: *Sets of postulates for the logic of propositions.*

Defining, with Schröder, the logic of propositions as a two-element logic of classes, the author obtains four extremely simple sets of postulates for this logic, the number of the postulates being respectively 5, 4, 3, 1. The complete existential theory is established for each set.

4. Professor Florian Cajori: *Newton's indebtedness to Descartes.*

Ordinarily, we think only of the long struggle for supremacy between the Newtonian and Cartesian explanations of the mechanics of the solar system, and we overlook Newton's indebtedness to Descartes, in such cases as the following: (1) Descartes, rather than Euclid, initiated the young Newton into geometry, (2) Descartes' algebra, not Oughtred's or Harriot's, familiarized Newton with the modern exponential notation for positive integral exponents which he later generalized by the introduction of negative and fractional exponents, (3) Newton studied Descartes' rule of signs for equations, and gave it a precise statement, (4) he acknowledged the Cartesian optical theory to be a "good step," (5) he referred appreciatively to Descartes' theory of vision, (6) he used Descartes' (and Snell's) law of refraction in the explanation of total reflection, (7) according to Conduit, it was Descartes' physical theory of color that started Newton's experiments with prisms.

5. Professor A. F. Carpenter: *Self-correspondence of the complex developables of a ruled surface under a point-line transformation of space.*

By means of a transformation of the points of space into the lines of a linear congruence, the developables whose cuspidal edges are the two branches of the complex curve of a ruled surface are shown to be self-corresponding in such a way that to the points of any curve C lying upon one of these developables correspond the lines of that developable which are intersected by C.

6. Professor D. N. Lehmer: *Note on the construction of tables of linear forms belonging to a given quadratic residue.*

This paper appears in full in the present number of this BULLETIN.

7. Mr. C. M. Cramlet: *Some determinant theorems as tensor equations.*

The h^2 differential equations $a_{ir}(\partial\varphi/\partial a_{ij}) = \varphi \cdot \delta_r^j$ have $\varphi = Aa$ as a general solution, where a is the determinant of the a_{ij}'s and A is a constant of integration. The most general operations with determinants which merely introduce a factor are found from the condition that these equations be invariant. The determination of the constant of integration under these transformations gives the multiplication theorems.

Using a tensor defined by Murnaghan in a note in the AMERICAN MATHEMATICAL MONTHLY, vol. 32, a list of general determinant theorems is given in tensor notation. It is shown that a determinant of a tensor of second rank is a tensor with h^{2n} components of $+a$'s, $-a$'s, and 0's. Knowing this, the relative tensor, discussed by Veblen and Thomas, TRANSACTIONS OF THIS SOCIETY, vol. 26, ceases to be an extension. Similar investigations will be made with ϱ-way determinants.

8. Professor R. E. Moritz: *A new generalization of Wilson's theorem.*

In volume 31 of the QUARTERLY JOURNAL OF MATHEMATICS, Glaisher proved that the sum of the products of the first $n-1$ integers taken $p-1$ together, p being any prime not greater than n, is congruent to $-r$, mod p, where r is the integral part of the quotient obtained on dividing n by p. If $n=p$ we have Wilson's theorem. The author shows that this theorem may be extended, with certain restrictions, to any n successive integers.

9. Professor R. E. Moritz: *A theorem in number congruences.*

The author proves that if n is any prime number greater than 3, the combinations of all numbers of the form $kn-1$ taken $n-1$ together leave the same remainder when divided by n^3, that is to say

$$C_{n-1}^{kn-1}-C_{n-1}^{ln-1} \equiv 0, \quad (\text{mod } n^3).$$

When $l=1$, we have

$$C_{n-1}^{kn-1} \equiv 1, \quad (\text{mod } n^3).$$

The special case of our corollary for $k=2$ has been previously proved by Wolstenholme, QUARTERLY JOURNAL OF MATHEMATICS, volume 5.

10. Dr. H. P. Robertson: *On certain solutions of Einstein's cosmological equations.* Second paper.

The author here considers manifolds whose line elements are of the form

$$ds^2 = f(x,y,z,t)\{dx^2+dy^2+dz^2\}-g(x,y,z,t)dt^2,$$

i. e., orthogonal four-spaces containing a family of three-spaces, $t =$ constant. The cosmological equations for the case of a dynamical field of this type are immediately reduced to six second order equations in one dependent and four independent variables. These equations contain six arbitrary functions (arising through the integration of third order equations) which are determined by the conditions of integrability. All manifolds of this type are found; interpreted as relativistic space-times they represent all dynamical worlds which admit of orthogonal coordinates in which the velocity of light is independent of direction at a point. The solutions yield geometric rather than physical interpretations.

11. Dr. H. W. Stager: *A factor table of the second and succeeding ten millions.*

In this paper the author describes the method to be employed in constructing a factor table to the ultimate limit of 100,000,000. Following out the general method used in constructing his *Sylow Factor Table*, the table will first be extended to 50,000,000. The use of an automatic device and a special form of rubber type in making the entries assures almost absolute accuracy. These tables will be of the same general form as Lehmer's well known *Factor Table*, but will only show the least divisor of numbers not divisible by 2, 3, 5, 7, or 11. The omission of numbers divisible by 11 will reduce the size of the volume for each 10,000,000 approximately one-eleventh, without materially increasing the labor of finding the factors of a number.

12. Professor R. M. Winger: *The ternary Hesse group and its invariants.*

The Hesse collineation group has received attention at the hands of several writers, including Jordan, Witting, Muth, Maschke, Newson, Burnside, Steinitz, and Blichfeldt. The present author makes a systematic analysis of the group on the basis of its generating transformations and the theory of collineations, discussing in particular those properties of the invariant configuration and curves which follow most directly from the properties of the group.

B. A. BERNSTEIN,
Secretary of the Section.