MATHEMATICS

Chairman: WILL E. EDINGTON, DePauw University

The MATHEMATICS SECTION met with the Indiana Section, MATHEMATICAL ASSOCIATION OF AMERICA.

Professor Paul M. Pepper, University of Notre Dame, was elected chairman of the section for 1944.

Irregularly regular polyhedra. LEON ALAOGLU and JOHN GIESE, Purdue University.—The classical regular polyhedra are generalized by considering polyhedra with all faces congruent but not necessarily regular polygons, with the same number of faces meeting at each vertex, and with two faces meeting at each edge. For finite polyhedra of genus zero (topological spheres) the Euler polyhedron formula reduces the possibilities to the usual five ranging from tetrahedron to icosahedron. Constructions using the maximum geometrically possible numbers of unequal edges are devised to show the existence of all of these five types except for the irregularly regular icosahedron with scalene triangular faces. For genus one (topological tori) the Euler formula reduces the possibilities to triangular, quadrilateral, and hexagonal faces. Constructions are devised to show the existence of the first two kinds of tori.

The elementary functions. EMIL ARTIN, Indiana University.—This paper shows how to introduce the elementary functions e^x, log x, cos x, sin x in a completely rigorous way, using only the simplest rules about limits. The proofs thus obtained cover all properties of these functions, all limit relations, and also the infinite product of sin x.

This makes it possible to have all these functions available from the beginning in a course on advanced calculus.

A method for the solution of algebraic or transcendental equations. M. GOLOMB, Purdue University.—The more common methods for determining the roots of equations have certain shortcomings. Newton's and Horner's methods apply only to real roots, while Graeffe's method applies only to algebraic equations, etc. A new method is derived from Hadamard's investigations on the singularities of functions defined by Taylor series. The symmetric functions of the zeros of smallest absolute value are given as limits of quotients of persymmetric determinants involving successive coefficients in the Maclaurin expansion for the reciprocal of the function.

Some developments in the analytic theory of continued fractions. MARION WETZEL, Indiana University.—Results contained in three recent papers: (1) E. D. Hellinger and H. S. Wall, *Contributions to the analytic theory of continued fractions and infinite matrices*, Annals of

Mathematics, vol. 44 (1943), pp. 103-127, (2) H. S. Wall and Marion Wetzel, *Contributions to the analytic theory of J-fractions*, to appear in an early issue of the Transactions of the American Mathematical Society, (3) H. S. Wall and Marion Wetzel, *Quadratic forms and convergence regions for continued fractions*, Duke Mathematical Journal, vol. 11 (March, 1944), point the way toward an *analytic theory* of continued fractions. That is, a theory in which many isolated facts may fit together in a unified structure. The unifying principle is the notion of a *positive definite J-fraction*, characterized by the fact that the J-form whose matrix is the imaginary part of the J-matrix (cf. (1)) is positive definite when the imaginary part of the variable z is positive. Included in this class of continued fractions are those of the Stieltjes theory and its later extensions, many of whose properties extend to the whole class. In addition, many new and old convergence theorems, including recent results on convergence regions, are contained in the theory of positive definite J-fractions.