ABSTRACTS OF PAPERS

SUBMITTED FOR PRESENTATION TO THE SOCIETY

The following papers have been submitted to the Secretary and the Associate Secretaries of the Society for presentation at meetings of the Society. They are numbered serially throughout this volume. Cross references to them in the reports of the meetings will give the number of this volume, the number of this issue, and the serial number of the abstract.

Algebra and Theory of Numbers

105. Richard Brauer and H. F. Tuan: *On simple groups of finite order*. I.

Using the theory of representations of groups the authors have obtained a number of results for groups of certain types of orders. The following result will be proved: If G is a non-cyclic simple group of order $g=pq^bh$, where p and q are primes and where b and h are positive integers with $h<p-1$, then either $G\cong LF(2, p)$ with $p=2^m\pm 1>3$ or $G\cong LF(2, 2^m)$ with $p=2^m+1>3$; conversely, these groups satisfy the assumptions. As an application, the authors determine all simple groups of order prq^b, where p, r, q are primes and where b is a positive integer. The only simple groups of this type are the well known groups of orders 60 and 168. (Received May 23, 1945.)

106. E. T. Browne: *Concerning a certain ring of homographies*.

In an earlier paper (Ann. of Math. (2) vol. 29 (1928) pp. 483–492) the author considered pairs of n-square matrices A, B which possess the property that not only $A^2=B^2=I$, but also that if $D=(1-\theta)A+\theta B$, then $D^2=I$ for every value of the scalar θ. Such a pair A, B may be said to determine a *linear class* of involutions to which D belongs. In this paper for n even he considers certain triples of matrices A, B, C over the field of complex numbers such that not only $A^2=B^2=C^2=I$, but, in addition, if $D=xA+yB+zC$, then $D^2=k^2I$, where k^2 depends only on x, y and z. Call such a triple a symmetrical triple. The four matrices A, B, C, I are shown to be linearly independent and to form the basis of an algebra of order four over the field of complex numbers. Methods are devised for obtaining from a given symmetrical triple other such triples, and in particular triples which are harmonic to the given triple. Geometric interpretations are given for the cases $n=2$ and $n=4$. (Received May 25, 1945.)

107. A. P. Hillman: *A note on differential polynomials*. II.

Let $F\neq 0$ and G be differential polynomials in the unknowns $y_1, \cdots, y_n$. Let G be of order q_i in y_i. It is known that if G has all the solutions of F, then $G^d=\sum_{j=0}^{s}C_jF_j$ where d and s are positive integers, the C's are differential polynomials, and F_j is the jth derivative of $F_0=F$. The author shows that for j greater than the maximum of the q_i, C_j is in the perfect ideal generated by F (that is, C_j has all the solutions of F). An analogous result holds for partial differential polynomials. (Received May 17, 1945.)

108. L. J. Mordell: *Further contributions to the geometry of numbers for non-convex regions*.

This gives an application of the methods recently discovered by the author to lattice points in the region $|x^n+y^n| \leqq 1$ where $m=p/q>4$ and p, q are odd integers. (Received April 9, 1945.)

Analysis

109. R. P. Agnew: *Tauberian theorems for Nörlund summability.*

It is shown that a Tauberian theorem for Nörlund summability given by R. P. Cesco (Universidad Nacional de La Plata, Publicaciones de la Facultad de Ciencias Fisicomatematicas (2) vol. 4 (1944) pp. 443–445) and more general theorems are implied by familiar Tauberian theorems for Abel summability. (Received May 14, 1945.)

110. R. H. Cameron: *Some examples of Fourier-Wiener transforms of analytic functionals.*

Let $F[x]=F[x(\cdot)]$ be a functional which is defined throughout the space K of complex continuous functions $x(t)$ defined on $0 \leqq t \leqq 1$ and vanishing at $t=0$, and let F possess the property that $F[x+iy]$ is Wiener summable in x over C for each fixed $y(\cdot)$ in K. (C is the subspace of all real functions in K.) Then the functional $G[y]=\int_C^W F[x+iy]d_W x$ is called the Fourier-Wiener transform of $F(x)$. Examples are given of various functionals $F(x)$ which have the property that the transforms of their transforms exist and equal $F(-x)$. The fact that there exist extensive classes of functionals having this property is proved in a paper by W. T. Martin and the author. (Received May 9, 1945.)

111. R. H. Cameron and W. T. Martin: *Fourier-Wiener transforms of analytic functionals.*

Let K be the space of all continuous complex functions $x(t)$ defined on $0 \leqq t \leqq 1$ which vanish at $t=0$, let C be the subset of all real functions of K, and let $F[x]$ be a functional defined on K. Then, as defined by one of the authors in another paper, $G(y)=\int_C^W F(x+iy)d_W x$ is called the Fourier-Wiener transform of $F(x)$ if it exists for all y in K. The purpose of the present paper is to exhibit three extensive classes of functionals which are taken into themselves in a one-to-one manner by the Fourier-Wiener transformation in such a way that the inverse transformation is $F(x)=\int_C^W G(y-ix)d_W y$. In particular, this property is enjoyed by the class E_m of functionals $F(x)$ which are mean continuous, of mean exponential type, and "entire," that is, continuous in the topology defined by root mean square distance between functions, bounded by $A \exp [B\int_0^1 x(t)^2 dt]^{1/2}$, and "entire" in the sense that $F(x+\lambda y)$ is entire in λ for all x and y in K. (Received May 9, 1945.)

112. Nelson Dunford and Robert Schatten: *On the associate and conjugate space for the direct product of Banach spaces.*

The direct product $E_1 \otimes_N E_2$ of two Banach spaces E_1, E_2 (Trans. Amer. Math. Soc. vol. 53 (1943) pp. 195–217), which naturally depends on the norm N, determines uniquely an "associate space" $\bar{E}_1 \otimes_{\bar{N}} \bar{E}_2$ ($\bar{N}$ is the norm "associate" with N) and a conjugate space $\overline{E_1 \otimes_N E_2}$. It is shown that for a "natural crossnorm," $\bar{L} \otimes_{\bar{N}} \bar{L}$ is a proper subset of $\overline{L \otimes_N L}$. Similarly, for a "natural crossnorm," $\bar{l} \otimes_{\bar{N}} \bar{l}$ is a proper subset of $\overline{l \otimes_N l}$. A related example of a non-reflexive crossspace $E_1 \otimes_N E_2$ is constructed, for which E_1, E_2, and N are all reflexive. (Received April 23, 1945.)

113. Herbert Federer: *Coincidence functions and their integrals.*