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.

310. Miss M. G. Humphreys: *The representation of integers as sums of values of quartic polynomials.* Preliminary report.

The most general polynomial of degree r in x which represents integers for $x \geqq 0$ is of the form $P_r(x) = a_r\,{}_xC_r + a_{r-1}\,{}_xC_{r-1} + \cdots + a_1\,{}_xC_1 + a_0$. When $r=4$ and $(a_4, \cdots, a_1)=1$, $a_0=0$, $a_4>0$, any sufficiently large integer is the sum of twenty-one values of $P_4(x)$ in all cases except when the coefficients satisfy one of three sets of conditions, of which the following is an example: $3/(a_4, a_3)$, $9 \nmid a_4$, $a_3 \equiv 6a_1 \pmod 9$, $a_4 \equiv 6a_2 \pmod 9$. The method used is similar to that of E. Landau in *Zum Waringschen Problem, Dritte Abhandlung* (Mathematische Zeitschrift, vol. 32 (1930), pp. 699–702). (Received August 7, 1934.)

311. Mr. J. F. Randolph: *Carathéodory measure and a generalization of the Gauss-Green lemma.*

The Gauss-Green lemma for the plane connects the double integral of a partial derivative of a function over a region R with the line integral of the function around the curve C bounding R. In the past many investigations have been concerned with the kind of regions and boundaries for which the lemma is valid. With the exception of a paper by Schauder, the boundary has been assumed to be a curve with a tangent almost everywhere. The present paper contains what seems to be extreme simplification of the conditions on the boundary. The Gauss-Green lemma is shown to hold for any simply connected region whose boundary has Carathéodory linear measure finite. Then by methods which have the effect of the usual cross cut scheme, applicable regions are extended to a wide class not simply connected. In the new auxiliary material is included the fundamental theorem that the inner Carathéodory linear measure of a set is the upper limit of the Carathéodory linear measure of closed components of the set. (Received September 26, 1934.)

312. Mr. Fritz Herzog: *Systems of algebraic mixed difference equations.*

The decomposition theory for systems of algebraic differential equations, developed by J. F. Ritt in his Colloquium Publication, and of algebraic difference equations, developed by Ritt and Doob, suggested a similar investigation