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

199. A. A. Albert: *Quasigroups*. I.

Associate with every quasigroup $\mathfrak{G}$ the group $\mathfrak{G}_T$ of nonsingular transformations on $\mathfrak{G}$ generated by the multiplications of $\mathfrak{G}$, and say that a multiplicative system $\mathfrak{G}'$ is isotopic to $\mathfrak{G}$ if there exist nonsingular mappings A, B, C on $\mathfrak{G}$ to $\mathfrak{G}'$ such that $xA \cdot yB = (x \cdot y)C$ for every x and y of $\mathfrak{G}$. Every quasigroup is isotopic to a loop (that is, a quasigroup with a two-sided identity element e). The normal divisors of a loop $\mathfrak{G}$ are then shown to be the subsets eW defined for normal divisors W of $\mathfrak{G}_T$, $\mathfrak{G}$ is simple if and only if the only intransitive normal divisor of $\mathfrak{G}_T$ is the identity group. All loops isotopic to simple loops are simple. A system $\mathfrak{G}$ is homotopic to $\mathfrak{G}'$ if $xA \cdot yB = (x \cdot y)C$ for equivalent mappings A, B, C on $\mathfrak{G}$ to $\mathfrak{G}'$ which may be singular. Then a loop $\mathfrak{G}$ is *homotopic* to a loop $\mathfrak{G}'$ if and only if $\mathfrak{G}$ is homomorphic to an isotope of $\mathfrak{G}'$. (Received June 7, 1943.)

200. William H. Durfee: *Congruence of quadratic forms over valuation rings.*

Let R be a complete valuation ring whose associated residue-class field has characteristic not two. An equivalent diagonal form for an arbitrary quadratic form over R is obtained, and it is shown that two such nonsingular diagonal forms are equivalent if and only if their corresponding subforms composed of those terms having the same value are equivalent. Using this the author proves for forms over R a theorem stated by Witt for fields and extended by Jones to the p-adic integers, namely, if f, g, and h are nonsingular quadratic forms such that g and h each has no variables in common with f, then $f+g$ and $f+h$ are equivalent if and only if g and h are equivalent. (Received August 2, 1943.)

201. H. L. Lee: *The sum of the kth power of polynomials of degree m in a Galois field.* Preliminary report.

Let $M = c_0x^m + c_1x^{m-1} + \cdots + c_{m-1}x + c_m$ be a polynomial in the Galois field $GF(p^n)$. If $c_0 = 1$, M is called primary and if $c_0 \neq 0$, write deg $M = m$. Let S_m^k and R_m^k denote respectively the sum of the kth power of polynomials M of degree m, and of all M of degree less than m. By the use of two functions $\psi_m(t) - F_m$, $\psi_m(t)$, which vanish when M is primary and of degree m in one case and when deg $M < m$ in the other, the sum may be made to depend on an exponent less than k. Then S_m^k and R_m^k