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

1. A. A. Albert: *Quasigroups*. II.

A loop is a quasigroup with an identity element. In this part it is shown that H is a normal divisor of a loop G if and only if $(xH)(yH) \subset (xy)H$, $xH \subset (xH)h$, $(xy)H \subset x(yH)$ for every x and y of G and h of H. The intersection and union of two normal divisors of G are normal divisors of G, and the standard theorems used to prove the Jordan-Hölder theorem and the Schreier refinement theorem are valid for loops (although the proofs are very different). The paper shows how to extend the notion of solvable group to loops and also proves that various results of the theory of groups are also valid for loops. A construction is given of all loops with a given normal divisor and a given quotient loop, and the theory is applied to give an explicit determination of all loops of order six with a subloop of order three. Finally it is shown that all quasigroups of order five not isotopic to the group are isotopic to each other. (Received October 15, 1943.)

2. A. A. Albert: *Quasiquaternion algebras*

A quasiquaternion algebra has a basis 1, i, j, ji over a field F such that $i^2=a+bi$, $ij=j(1-i)$, $j^2=c$ for a, b, c in F, $c\neq 0$, $b\neq 1$. Also $b=0$ when F has characteristic different from two and one writes $A=(a, c)$ in this case. All quadratic subalgebras are determined and it is shown that (a, c) is isomorphic to (a_0, c_0) if and only if $a_0=a$, $c_0=d^2c$ for $d\neq 0$ in F. The results in the characteristic two case are slightly different. A quasiquaternion algebra is a division algebra if and only if the algebras $F[i]$ and $F[j]$ are fields. If F is a finite field of q elements there are division algebras of this kind over F if and only if q is odd. Then there are $1/2(q-1)$ such algebras not isomorphic in pairs. The question as to when two algebras over F of characteristic not two are isotopic is completely solved for quasiquaternion division algebras. (Received October 15, 1943.)

3. J. L. Brenner: *The linear homogeneous group*. II.

Let (x_i) represent an n-tuple (vector) whose elements are residue classes mod p^r (p, prime; r, positive integer). The p^{nr} vectors (x_i) form a group $\mathfrak{A}$ under the operation vector addition: $(x_i)+(y_i)=(z_i)$, $z_i\equiv x_i+y_i$ (mod p^r). An automorphism of $\mathfrak{A}$ may be defined by specifying the n images (a_{ji}) of the generators $e_j=(0, \cdots, 1_j, \cdots, 0)$, where det $(a_{ji})\not\equiv 1$ (mod p). $\mathfrak{G}_{p,n,r}$ is the group of these automorphisms. In this article the lattices of normal and of characteristic subgroups of $\mathfrak{G}$ are described; the lattices are distributive except when $n=p=2$, in which case they are not distributive. $\mathfrak{N}_s$ con-