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

454. R. H. Bruck and T. L. Wade: *The number of independent components of the tensor* ${}_{[\alpha]}T_{i_1\cdots i_p}$.

Let $T_{i_1\cdots i_p}=\sum_\alpha {}_{[\alpha]}T_{i_1\cdots i_p}$ represent the decomposition of an arbitrary tensor $T_{i_1\cdots i_p}$ into tensors of various symmetry types, a type corresponding to each partition $[\alpha]$ of the indices $i_1 \cdots i_p$ (H. Weyl, *The Classical Groups*, pp. 96–136; T. L. Wade *Tensor algebra and Young's symmetry operators*, American Journal of Mathematics, vol. 63 (1941) pp. 645–657). J. A. Schouten (*Der Ricci-Kalkül*, chap. 7, §7) considers the problem of finding the number of independent scalar components of c_α of the tensor ${}_{[\alpha]}T_{i_1\cdots i_p}$ and obtains expressions for c_α in terms of the dimension n of the coordinate system in the cases $p=2, 3, 4$, but the difficulties of his method become great for $p\geqq 5$. In this note it is shown that c_α is equal to r_α, the rank, recently defined by the authors, of the immanent tensor ${}_{[\alpha]}I^{i_1\cdots i_p}_{j_1\cdots j_p}$ (abstract 47-5-185). The general formulas for the r_α's in terms of n may be obtained directly from the character table of the symmetric group on p letters whenever this is available, as for $p\leqq 13$. Tables of $c_\alpha=r_\alpha$ are given for $p\leqq 6$. (Received October 1, 1941.)

455. A. D. Campbell: *On the application of an algebra of sets to group theory.*

In this paper is assumed the existence of a set S of abstract entities (including 0 and 1) whose subsets are used as coordinates for groups, subgroups, elements of groups, sets of elements, and neighborhoods (in the study of topological groups). The relation $\alpha\subset\beta$ means that the element (or set or group or neighborhood) α is contained in the set (or group or neighborhood) β. By (α, β) is meant the join of α and β, by $\alpha\cdot\beta$ the meet of α and β. The unit element is called 1, the null-set (or null-group) is called 0. By $\alpha\beta$ is meant the set consisting of all products of elements of α by elements of β (in this order). Obvious meanings are given to $\alpha-\beta$ and α^{-1}. It is agreed that $[\alpha_1, \alpha_2, \cdots, \alpha_n]$ shall mean the group generated by $\alpha_1, \alpha_2, \cdots, \alpha_n$ and that $0\alpha=\alpha 0=0$, $1\alpha=\alpha 1=\alpha$, $\alpha\cdot 0=0$, $\alpha-0=\alpha$. It is to be noted that $(\alpha, \beta)\gamma=(\alpha\gamma, \beta\gamma)$ and $(\alpha-\beta)\gamma=\alpha\gamma-\beta\gamma$ and $(\alpha\cdot\beta)\cdot\gamma=(\alpha\gamma)\cdot(\beta\gamma)$; also that for a group $\alpha\alpha=\alpha$, $\alpha\alpha^{-1}=\alpha$, $\alpha^{-1}=\alpha$. By this algebra old theorems are readily proved and new ones are derived. Thus it follows that if $\alpha=(\beta, \gamma)$ is a finite group of order a with β as a subgroup of order b and with $\beta\cdot\gamma=0$, then the relation $\beta\alpha=(\beta\beta, \beta\gamma)=(\beta, \beta\gamma)$ shows clearly (since $\beta\cdot(\beta\gamma)=0$) the well known result that $a=b+bc=b(1+c)$. (Received September 15, 1941.)