ABSTRACTS OF PAPERS

SUBMITTED FOR PRESENTATION TO THIS 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.

192. Dr. A. E. Ross: *On criteria for universality of ternary quadratic forms.*

Necessary and sufficient conditions are derived in terms of generic characters that an indefinite ternary quadratic form, classic or non-classic, represent all positive and all negative integers. Such a form must represent zero properly. The theorem for classic ternary quadratic forms was proved by the author (Abstract, this Bulletin, vol. 36 (1930), p. 364) by use of a result of A. Meyer. This paper proves the theorem without use of the equivalence criterion of Meyer and similarly derives the theorem for non-classic forms. Theorem 1. Let f be a properly primitive indefinite classic ternary quadratic form with reciprocal F and determinant D. The necessary and sufficient conditions that f be universal are: D is odd or double an odd integer, $\Omega=\pm 1$, and $(F/p)=(-\Omega/p)$ for every odd prime p dividing $\Delta=D$. Theorem 2. Let f_1 be a primitive indefinite non-classic ternary quadratic form. Consider an improperly primitive form $f=2f_1$ with reciprocal F. Then f_1 is universal if and only if $f=2f_1$ satisfies the following conditions: $\Omega=\pm 1$, the characters of f are $(-1)^{(F-1)/2}=(-1)^{(-r-1)/2}$, $(F/p)=(-\Omega/p)$ for every odd prime p dividing $\Delta=D$, and, in case 4 divides Δ, also $(-1)^{(F^2-1)/2}=1$. These theorems serve as a practical test for determining whether a given ternary quadratic form is or is not universal. (Received July 19, 1932.)

193. Dr. C. F. Luther: *Concerning primitive groups of class u.*

In this paper are proved three general theorems concerning the degree and class of multiply transitive groups. The first gives an upper limit to the degree of a substitution group of class u that contains a substitution of order two and degree $u+\epsilon$ (ϵ a positive integer), and is more than $p_1+p_2+p_3+\cdots p_r$ times transitive, where $p_1, p_2, p_3, \cdots, p_r$ are distinct odd prime numbers and $r>1$. It is $u>n-\epsilon-(n+2\epsilon p_1p_2\cdots p_r)/((p_1-1)(p_2-1)\cdots(p_r-1))$ if ϵ/u is small. Limits are also given for 2, 3, 5, 6, 7, and more than p (a prime)-ply transitive groups. The second theorem gives an upper limit to the degree of a triply transitive group of class $u(>3)$ that contains a substitution of degree $u+\epsilon$ (ϵ a positive integer) and of order p^c (p an odd prime). The third theorem gives an upper limit to the degree of a doubly transitive group of class u that contains a substitution of degree $u+\epsilon$ (ϵ a positive integer) and of prime order p (p an odd prime). (Received July 20, 1932.)