BOOK REVIEWS


The arithmetic theory of quadratic forms, one of the most venerable subjects of present-day mathematics, may well appear to consist of a collection of scattered results from elementary number theory on such questions as the representation of integers by squares—at least this is the impression one obtains after reading Dickson's *History*, for example. Thus, completely apart from any other merits O'Meara's *Introduction to quadratic forms* may possess or lack, its appearance should cause pleasant surprise among many classically-trained mathematicians, not excluding quadratic formalists themselves, who will find that so orderly and unified a body of material can be presented from such an apparent assortment of facts.

This unification is not, however, the only novelty of the book. O'Meara, assuming as prerequisite a knowledge of first-year algebra and elementary topology, presents his subject within the framework of abstract algebra, thereby providing both greater clarity and generality; for example, $p$-adic numbers enter as a natural outgrowth of valuation theory, rather than as the formal power series with complicated rules of operation used by Jones in *The arithmetic theory of quadratic forms*, or as the frightful systems of congruences modulo prime powers used by Watson in his *Integral quadratic forms*. Furthermore, being able to quote from linear algebra, O'Meara can use the language of inner-product spaces, thus avoiding the cumbersome double-summations of the forms themselves. But the most striking point of all is the author's realization that the only suitable way to approach the subject, even in the case of forms having rational coefficients, is via algebraic number theory, a fact he exploits to the fullest.

In this "modern" approach, O'Meara is following the example set by Eichler in *Quadratische Formen und orthogonale Gruppen*, but the two books are hardly comparable, even apart from the discoveries of the eleven years between their dates of publication. Eichler has gone less deeply into matters of classification and has instead included analytic theory; he has written a work that is extremely condensed and hardly self-contained, neither of which can be said for the book under review. It should be hurriedly pointed out that the words "modern" and "abstract" are here being used without praiseworthy