A university algebra. By D. E. Littlewood. London, Heineman, 1950. 8+292 pp. 25s.

Something less than the first half of this book is concerned with the same kind of subject matter as in the text by Stoll reviewed above. However, Littlewood's matrix theory goes beyond Stoll's (and beyond most standard treatments) by including a great deal of material on the theory of determinants, which in turn motivates a smattering of permutation group theory and a large amount of detail on symmetric and alternating polynomials (all this presumably with an eye to applications to group representations later in the book). The next third of the book contains a more or less standard account of the theory of equations, some elementary theory of numbers, a little field theory in connection with the subject of polynomials, and a short chapter on the Galois theory of equations (by resolvents). The remainder of the book is devoted to the more advanced topics of invariants and group representations, the latter attacked via the Wedderburn theory of algebras, ending with a discussion of the irreducible characters and representations of the symmetric, general linear, and orthogonal groups.

The text is pitched at the advanced undergraduate or beginning graduate level. The calculational sections and the examples are worked out in detail, and the book is well supplied with exercises. On the other hand, the theoretical sections of the text tend to be condensed or slurred over, making them quite obscure at times, and of dubious accessibility to the uninitiated.

The fundamental approach in this volume is almost the opposite of Stoll's. In matrix theory, for example, the center of the stage is occupied by n-tuples and matrices, with their attendant canonical bases, rather than by abstract vector spaces and linear mappings thereon. This lack of what one might call a geometrical approach results, of course, in a computational matrix theory, in contrast with the more conceptual linear transformation theory where no basis is a preferred one. However, algebra and geometry, which had been divorced by decree in the very first section, are reconciled at last in one of the late chapters, on the theory of invariants, which theory "eliminates all the heavy and irrelevant work which the superfluous frame of reference carries with it, and restores the simplicity and elegance which are chacteristics of pure geometry."

Like Stoll, Littlewood introduces the concepts of group, ring, integral domain, and field in short parenthetical sections when the concepts arise naturally. However, this leaning toward "abstract algebra" is perfunctory. For example no definitions are given for