BOOK REVIEW

Lectures in abstract algebra, Vol. III, *Theory of fields and Galois theory*. By Nathan Jacobson. Van Nostrand, Princeton, N. J., 1964. 323 pp. $9.75.

This book is the third and last of a series of distinguished books by Jacobson which lay out the foundations of abstract algebra. The first two books have already had a wide acceptance and use both as textbooks and source material. It is obvious that this third volume is destined to play the same role. To this reviewer's mind this volume is by far the best and most unusual of the three. In keeping with the style set in all Jacobson's books, be they elementary or very advanced, this book is chock-full of material, often material that is difficult to find elsewhere. As a consequence the book probably will not be easy to read for a casual student, but a serious student who works at the material will get a large pay-off in return for his efforts. There is perhaps a tendency in the book to state results in a very general form which could perplex a person seeing these things for the first time. But these are minor criticisms when confronted with the many, many pluses that the book enjoys.

As its title implies, the book is a study of fields and of Galois theory. The reader expecting the usual Artin treatment of Galois theory has a surprise in store for him—he won't find it here. It is refreshing to see Galois theory handled in a different way. The approach is motivated by the work Jacobson has done on noncommutative Galois theory. Not only does it give the classical commutative field results but it also sets up the machinery to handle the noncommutative situation or to pass on to the kind of work on Galois theory being done now by such people as Chase, Harrison and Rosenberg. It is rooted in the Jacobson-Bourbaki Lemma which describes the commuting ring of a vector space of endomorphisms in the ring of endomorphisms of the additive group of a field. Exploiting this result, the author goes on to develop the Galois theory. In quick order the usual concepts and results come out. Trace and norm make their appearance and there is a short discussion of crossed products and cohomology theory. Having obtained the general results of Galois theory the author sets himself to applying them to the study of the theory of equations. He gets Galois' criterion for solvability by radicals and applies it to obtain Abel's theorem. However, unfortunately no mention is made of the impossibility of trisection or other classical constructibility theorems. (In a sense these belong in more elemen-