torical, biographical, and bibliographical information will convey to the student the enthusiasm of the pioneers in this field of research, put him in contact with the original ideas in their bare form (not overshadowed by symbolism, however powerful), and give him access to the more extensive treatises on this subject.

Another good reason is that the visual content of "geometry" is emphasized, also by a large use of appropriate illustrations. The geometric point of view, so helpful also in researches on more abstract spaces, pervades and illuminates these lectures.

The analytic apparatus (Gibbs vector notation) is appropriate to the subject and its use is always subordinate to the development of the geometric ideas.

A large collection of problems, some for class use and some serving as hints for advanced research, enriches the volume.

The presentation of ideas and of proofs and the typographical presentation are excellent.

E. BOMPIANI

Grundzüge der Galois'schen Theorie. By N. Tschebotaröw. Trans. and ed. by H. Schwerdtfeger. Groningen, Noordhoff, 1950. 16 +432 pp. f 20.00.

The present (German) edition is a reworked and annotated version of the original (Russian) edition, the date of which is unknown to the reviewer but is certainly prior to 1940; it is based on a series of lectures given at the University of Kasan. The author believes that the modern or abstract recasting of algebra is responsible for increased insight and spectacular advances, but that the abstract approach is not suited to the young student, who should have a thorough foundation of concrete mathematics on which subsequently to lay the abstractions and generalizations. In this book, which is intended to meet the needs of such students, he endeavors to preserve the spirit of classical concrete galois theory and at the same time to introduce such notions as will facilitate the readers' ability to assimilate and appreciate the abstract theory, presumably at some later time.

Chapter I (110 pages) is devoted to group theory, with emphasis on finite groups and, especially, permutation groups, and includes an appendix on A. Loewy's "Mischgruppen" (abstract system of which a realization is the set of all isomorphisms of a field extension of a field K into an algebraic closure of K, with multiplication only sometimes defined), and an appendix containing some remarks on a theorem of Bertrand concerning the symmetric group. Chapter II (76 pages) treats polynomials and fields (with emphasis on number fields, but with occasional excursions into abstract fields), contains considerable material on irreducibility criteria and introduces the concepts of the root (or splitting) field of a polynomial and normal field extension. Chapter III (91 pages) concerns the galois group of a polynomial (defined as a permutation group), gives the fundamental theorem of galois theory, and contains an appendix on Loewy's treatment of non-normal field extensions. Chapter IV (90 pages) discusses the connection between solvable groups and solvability by radicals, with numerous classical applications, and contains an appendix giving a table of the cyclotomic polynomials for $2<m\leqq 60$. Chapter V treats finite fields and the question of equations with prescribed galois group. A final Appendix is devoted to the elements of the theory of rational numbers.

The book proceeds at a leisurely pace and is readable. In the reviewer's opinion, the author has eschewed the modern approach with excessive zeal; this at times results in a loss of clarity. On the positive side one finds a great wealth of illustrative examples and exercises.

E. R. KOLCHIN

An introduction to probability theory and its applications. Vol. I. By William Feller. New York, Wiley, 1950. 12+419 pp. $6.00.

This is the first volume of a projected two-volume work. In order to avoid questions of measurability and analytic difficulties, this volume is restricted to consideration of discrete sample spaces. This does not prevent the inclusion of an enormous amount of material, all of it interesting, much of it not available in any existing books, and some of it original. The effect is to make the book highly readable even for that part of the mathematical public which has no prior knowledge of probability. Thus the book amply justifies the first part of its title in that it takes a reader with some mathematical maturity and no prior knowledge of probability, and gives him a considerable knowledge of probability with the necessary background for going further. The proofs are in the spirit of probability theory and should help give the student a feeling for the subject.

Probability theory is now a rigorous and flourishing branch of analysis, distinguished from, say, measure theory, by the character and interest of its problems. It is true that probability theory, like geometry, had its origin in certain practical problems. However, like geometry, the theory now concerns itself with problems of interest per se, many of which are very idealized, and have only a remote connection or no presently visible connection, with practical problems.