Die Lehre von den Kettenbruchen. 3d ed. Vol. I. *Elementare Kettenbruche.* By Oskar Perron. Stuttgart, Teubner, 1954. 6+194 pp. 29.40 DM.

Earlier editions of Die Lehre von den Kettenbruchen are divided into two parts, the first containing the arithmetic theory of continued fractions and the second containing the analytic theory. The author's plan for the third edition is to treat these two parts in separate volumes. Volume I is an enlargement and improvement of what was previously Part I. The chapter headings of Volume I are identical with those of Part I in the second edition (Teubner, Leipzig, 1929) and, in fact, most of the sections of Volume I are a verbatim reproduction of the corresponding sections of Part I. There has been some re-partitioning of material in the various sections, and six new sections have been added. The early introduction of matrix notation has improved the presentation of certain sections. Additional material on diophantine approximation is given (§14) and some references to recent investigations in this field are cited. A continued fraction proof is given for classical decomposition theorems on 2×2 matrices with determinant ± 1 (§18), and a brief alternate proof of the Lagrange theorem on periodicity is given (§21). The continued fraction expansion for irrationals of the form $2^{-1}(1+(4G+1)^{1/2})$ is applied to the solution of the diophantine equation $x^2-xy-Gy^2=1$ (§30). The derivation of the regular continued fraction expansion for $e^{2/m}$ (§34) is accomplished easily without recourse to Lambert's function-theoretic expansion for tan z as in earlier editions. The chapter on semi-regular continued fractions includes material on the shortest and longest expansions for a given rational number (§39), on the approximation to a real number by the approximants of a semi-regular expansion of the number (§41), and on the nearest and "farthest" integer continued fractions (§43).

W. T. Scott

Grundlagen der analytischen Topologie. By G. Nöbeling. Berlin, Springer, 1954. 10+221 pp. 33 DM.; clothbound, 36.60 D.M.

This carefully written monograph has a good chance of becoming the definitive text on the subject which it treats.

The basic primitive concept dealt with is the topological (partially) ordered set V, the word "topological" conveying that there is a "closure operation" defined on the *elements* A of V, which is idempotent, monotone, and makes $A \leqq A^-$. Frequently the axioms are augmented to give abstract closure algebras, or even topological Boolean lattices.

The notion of an actual set of points has already been recognized as too specific to be a primitive concept for algebraic topology. In Professor Nöbeling's mature opinion, it is also not the best basis on which to build the ideas clustering about "point-set theory." For the purpose of making an orderly presentation of ideas, this is certainly true; but only a great deal of careful reflection can have persuaded the author to adopt closure systems (where there are no points) as his basic notion, and to assign a secondary position to the concept of topological space (that is, T-space). He recognizes the growing modern tendency of constructing topological spaces as vehicles for representing more abstract types of systems. Perhaps for such reasons (as well as those of logical economy) has he chosen to write a textbook in a manner which may at first seem pedagogically hazardous to some teachers. On the other hand, as he says, we can never estimate what concepts will be "important"; and we are now much richer in having such an essay available.

In contrast to some publications on topologized lattices, the author is not interested in a game of seeing how far you can get "without actually assuming a topological space." At frequent and appropriate points, some of the better known propositions of analytic topology, such as R. L. Moore's theorem on arc-wise connectedness, the Hahn-Mazurkiewicz characterization of a continuous curve, are presented in their original contexts.

Naturally, Stone's representation of Boolean rings, and Wallman's representation of topological Boolean lattices have prominent places; as do also their compactifications. (The work of Katětov, and of P. Samuel, is not included.) Filters and ultrafilters are the ideal vehicles of convergence for this treatment. Continuous real valued functions are replaced by the corresponding resolutions of the identity (confined to the dyadic rational indices), and complete regularity is defined in those terms. Considerable time is given to uniform structures and metrics.

Besides ["full"] compactness, $\aleph$-compactness, for each infinite cardinal $\aleph$, is studied. (Oddly, all alephs were inverted by the typesetter!) Paracompactness is mentioned, but later discoveries (A. H. Stone) about this concept apparently did not come to the author's attention in time.

There are exercises, not of the drill variety, occurring it would seem about one every five pages. The harder ones contain suggestions. There are more frequently occurring clearly marked examples. Physically (also) the book is well executed.

RICHARD ARENS