Principes et applications de l'analyse Booleenne, by M. Carvallo. Collection de Math. économiques, fasc. II. Gauthier Villars, Paris, 1965. xiii + 131 pages. Price: 30 F.

A compact booklet which, assuming a knowledge of lattice-theory, develops Boolean algebra and applies it to the theory of networks.

H. A. Thurston, University of British Columbia

A Vector Space Approach to Geometry, by Melvin Hausner. Prentice-Hall Inc., Englewood Cliffs, N. J., 1965. x + 397 pages. $12.00.

Although the table of contents reads like that of a book on linear algebra this book is not a linear algebra but, as the author insists, a book on geometry. Its main purpose is to develop affine and Euclidean geometry of 2- , 3- and n-dimensional space from the analytic point of view. The basic algebraic tools are barycentric coordinates, vectors, vector spaces, linear and affine transformations, matrices and determinants. These algebraic topics are introduced and developed as needed, their introduction being well motivated by the geometry. The book is filled with interesting examples and analogies from other fields and there is much to stimulate the students' interest. There is a very full and excellent discussion of oriented areas in the plane and oriented volumes in 3- and n-dimensional space. This discussion is used to motivate the axiomatic definition of a determinant as a linear skew-symmetric function of the column vectors of a square matrix. The book ends with a chapter on groups and an exposition of Klein's Erlangen Program. At this point one regrets that the author did not include a chapter on projective geometry. The book grew out of an in-service training course for teachers and it seems well suited to this purpose. Its main use as a textbook is likely to be in courses for prospective high school teachers since it contains a large body of material in common with regular courses in linear algebra.

D. C. Murdoch, University of British Columbia

Theory of Retracts, by Sze-Tsen Hu. Wayne State University Press, Detroit, 1965. 234 pages. $13.50.

The notion of retracts was created by K. Borsuk in his thesis in 1931. The absolute neighbourhood retracts introduced by him in 1932 are a class of spaces which generalize polyhedra and retain many of their desirable properties. The theory of retracts has since grown into an extended and important branch of topology, and many of its concepts are now included among the tools of every practising topologist. Most of its results were so far only accessible in periodicals. S.-T. Hu sets out to organise them for the first time in a reference book.

He starts with a treatment of the elementary properties of retracts, deformation retracts and neighbourhood retracts found by Borsuk. Then he defines absolute (neighbourhood) extensors (ANE's) and absolute neighbourhood retracts (ANR's) for an arbitrary weakly hereditary topological class of spaces, shows that in both cases the class of all metrizable spaces is the best choice, and relates the two concepts to each other. The properties of ANE's and ANR's are dealt with, including Hanner's theorem that being an ANE is a local property. Infinite simplicial polytopes are studied with regard to the question whether they are ANR's.

Next various necessary and sufficient conditions for a metrizable space to be an ANR in terms of homotopy extension properties, partial realizations of polytopes, small deformations and dominating spaces are established. Similar conditions are then found for locally n-connected spaces and used to prove that for finite-dimensional metrizable spaces local n-connectedness, local contractibility and being an ANR are equivalent conditions. Borsuk's counter-examples are included which show that this is not true for infinite-dimensional compacta.

There follows a discussion of adjunction spaces and mapping spaces of ANR's and of Borsuk's results on compact ANR's in Euclidean spaces. The final chapter is devoted to deformation retracts. A theory of obstructions to deformations is sketched and used to establish necessary and sufficient conditions for deformation retracts in terms of homotopy and homology.

S.-T. Hu has not only succeeded admirably in the task he set himself of producing a useful and well-organised reference book, but has given us at the same time a very lucid and readable treatise on the subject. The book, which can be read by anybody with a basic training in general and algebraic topology, makes quite recent contributions to the field accessible with unexpected ease. It includes many proofs in full; for some the reader is referred to the original papers. Frequent references in the text and at the end of most sections clearly indicate the source of the material, encourage comparison with the original literature and stimulate further reading. The book finishes with a comprehensive and up to date bibliography. It will be welcomed warmly by all budding and full-blown topologists, and deserves to become a standard reference work.

Helga Schirmer, University of New Brunswick

<u>Geometric Invariant Theory,</u> by D. Mumford. Ergebnisse der Math. N.S. Vol. 34. Springer-Verlag, Berlin, 1965. 146 pages.

In this monograph, the author is concerned with the construction of schemes of moduli over algebraic objects and, more generally, with the problem whether an algebraic scheme, acted upon by an algebraic group, admits an orbit space. The book is written entirely in Grothendieck's language of schemes, and can only be read by those who are

https://doi.org/10.1017/S0008439500027752 Published online by Cambridge University Press