BOOK REVIEWS

Modern algebraic topology. By D. G. Bourgin. Macmillan, New York, 1963. xiii+544 pp. $11.50.

The volume under review must surely constitute the most comprehensive study of algebraic topology in the literature. Admittedly this is a very big book, having 544 pages; but, even so, it is a remarkable feat to have assembled in that span, starting from scratch, a discussion of the techniques and methodology, and a statement of the principal results in all the basic areas of homology theory, except for obstruction theory, cohomology operations and extraordinary cohomology.

The book is divided into 17 chapters and an appendix devoted to point-set topology. Chapter 1 (*Preliminary algebraic background*) gives the most elementary relevant algebraic definitions. In Chapter 2 (*Chain relationships*) the chain groups of a simplicial complex are defined, and in Chapter 3 (*Fundamentals of the absolute homology groups and basic examples*) the absolute homology groups of finite complexes are introduced, some computations made and pseudomanifolds defined.

Chapter 4 (*Relative omology modules*) consists in the main of an injection of a further quantity of basic algebra—vector spaces, modules, direct sums and products, graded modules and algebras, chain modules, exact sequences, cochains, cohomology. There is also a discussion of the dual complex. The term "omology" to describe the concept of which homology and cohomology are manifestations makes its remarkable appearance in this chapter. Simplicial manifolds are defined in Chapter 5 (*Manifolds and fixed cells*) and Poincaré duality is proved for them. A geometrical interpretation is given of cocycles and the chapter closes with a treatment of the Lefshetz number of a self-chain-map.

Chapter 6 (*Omology exact sequences*) provides yet another infusion of algebra. The exact homology sequence is obtained from a short exact sequence of chain complexes and applied to obtain the Mayer-Vietoris sequence and the exact sequence of a triple. There are also sections devoted to chain homotopy and to tensor products (over an integral domain).

Chapter 7 (*Simplicial methods and inverse and direct limits*) takes up the question of the invariance of the homology groups under subdivision and hence defines, through the simplicial approximation theorem, the homology homomorphism induced by a continuous