functions of those of the other in a manner independent of coordinates) the numbers of components are the same (p. 16), without any continuity hypotheses. Also, the discussion of the domains of various functions (especially those giving the transformation of components under a change of coordinates) is not satisfactory. The reviewer may hardly seem entitled to make these criticisms of terminological and conceptual casualness in view of a similar carelessness in his own 1952 work; yet he cannot help notice with regret that the present authors have made no apparent attempt to meet the standards of clarity and precision achieved in the last decade.

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Combinatorial topology. Vol. 3. By P. S. Aleksandrov. Translated by Horace Komm. Graylock Press, Albany, N. Y., 1960. 8+148 pp. $6.50.

This Vol. 3 is the English translation of the last two parts, Parts IV and V, of Aleksandrov's *Kombinatornaya topologiya* (OGIZ, Moscow-Leningrad, 1947). The English translation of Parts I–III has been previously published in Vols. 1 and 2 (See the Review in this Bulletin, **62** (1956), 629–630; **64** (1958), 300–301). The present Vol. 3 is devoted to two topics of homology theory: the Alexander-Pontrjagin duality theorem and an introductory theory of mappings of polyhedra.

Part IV consists of Chapters XIII–XV. Homological manifolds are introduced in Chap. XIII, together with preliminaries needed for the proof of the Alexander-Pontrjagin duality theorem. At the same time, the Poincaré-Veblen duality theorem is proved. Chap. XIV begins with Čech cohomology groups of compact Hausdorff spaces, and then proceeds to the proof of the Alexander-Pontrjagin duality theorem. In Chap. XV, the original Alexander duality theorem is given a separate proof, which is independent of Chap. XIV and is preceded by a discussion of linking in Euclidean spaces.

Part V is divided into two chapters. Chap. XVI presents several classical elementary theorems on mappings. One finds here Poincaré-Bohl's theorem, Brouwer fixed point theorem, theorems on continuous vector fields, and, most important of all, Hopf's classification theorem on mappings of an n-sphere into another. The final Chap. XVII, devoted to the Lefschetz-Hopf fixed point theorem, is a revision of Chap. 14 of Alexandroff-Hopf's *Topologie* I (Springer, Berlin, 1935).

The material of this volume is well chosen. All the theorems are important, of classical nature and have great esthetic appeal. The entire book (all three volumes) is intended to be an introductory text on homology theory; homotopy theory being outside its scope. The original Russian edition was published in 1947, but its manuscript was completed in 1941. Thus the treatment of homology theory is that of two decades ago. Needless to say, the modern spirit is absent and the new development is not touched on. However, as an introduction to the classical homology theory, this is an excellent book. The material is well organized, and presented with great detail and care. An attractive feature is the wealth of remarks, examples and figures, with which the author elucidates the theory masterfully. Its emphasis on geometric insight and limited use of algebraic concepts make the book easily accessible to the beginning students. The book is essentially self-contained and can be understood by a reader with little mathematical background. After studying the classical homology theory from this book, the reader will be well prepared for the more modern and more complete treatises. The translator deserves a vote of thanks for making the book available in English.

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