Singular homology and cohomology are defined in the first two sections to the extent that they are needed for the purpose. Following the scheme due to Eckman the detailed proof of De Rham theorem is presented and other approaches to and slightly stronger statements of the theorem are formulated as exercises to readers.

Tanjiro Okubo,
McGill University

Universal Algebra, by G. Grätzer. xvi+368 pages. Van Nostrand, Princeton, N.J., Toronto, London, Melbourne, 1968. Cdn. $15.

This book is the first complete account of the present state of universal algebra and it will probably remain for a long time the standard textbook of it, both for those who want to get acquainted with the subject as for those who need it as a reference book for their own research. The amount of material contained in it is tremendous and the author deserves highest admiration for all the time and energy he has devoted to writing this book. We give a summary of its content:

Ch. 0. Basic Concepts. Set theory, preliminary definition of algebra, equivalence relations, mappings, partially ordered sets, ideals in semilattices.

Ch. 1. Subalgebras and Homomorphisms. Definition of universal algebra, subalgebra, homomorphism and congruence relation, polynomial symbol (term), the subalgebra lattice and the congruence lattice of an algebra, the homomorphism theorem and the isomorphism theorems.

Ch. 2. Partial Algebras. The notions of chapter 1 are extended to partial algebras and applied to prove the author's and E. T. Schmidt's characterization theorem for congruence lattices.

Ch. 3. Constructions of Algebras. Direct products, subdirect products, direct and inverse limits, reduced products, prime products.

Ch. 4. Free Algebras. Existence, G. Birkhoff's characterization of equational classes, consistency, equational completeness, identities in finite algebras, free algebras generated by partial algebras, free products, word problem.

Ch. 5. Independence. Independence and bases of free algebras, invariants in finite algebras, generalizations.

Ch. 6. Elements of Model Theory. Construction of first order logic, satisfiability, elementary equivalence and elementary extensions, prime products, axiomatic classes.

Ch. 7. Elementary Properties of Algebraic Constructions. Sentences preserved under formation of subalgebras, extensions, chain unions, direct products and subdirect products.

Ch. 8. Free Σ-Structures. The author's theory of free structures over a first order axiom system.

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Each chapter is followed by a list of exercises and a list of open problems, many of which reflect the author's special interest in problems of a combinatorial type.

The book also contains a fairly complete bibliography on universal algebra including more than five hundred items.

The admiration the reviewer feels for the content of the book and for the arrangement of the material does not in all cases extend to the presentation of the detail. It is, for example, not quite clear to the reviewer whether the author's polynomial symbols are objects of the theory or just "symbols", i.e. metamathematical notions. Both views are, of course, possible and one might argue that in the final outcome it does not really matter which view one takes. But it would have been highly beneficial for the beginner to have at least included some comments concerning the use of metamathematical notions versus objects of the theory.

There are many places in which one feels that the author's main concern is to provide an overall picture of a situation rather than a rigorous argument. This certainly has its merits and, at times, is highly enlightening, but in many instances it leads to statements which, if taken verbally, are just not correct. To mention only one important example: Birkhoff's characterization of equational classes as stated in this book (p. 171, Theorem 3) is incorrect. Since the author is reluctant to admit the product of the empty family, the empty class becomes equational but cannot be characterized by equations.

But these little things can in no way detract from the value and importance of this book. Indeed, everybody interested in universal algebra can only be grateful to the author to have provided us with this unique source of information.

G. Bruns,
McMaster University, and the University of Massachusetts

Algèbre moderne et théorie des graphes, orientés vers les sciencies économiques et sociales, Tome I, par Bernard Roy. 416 pages. Dunod, Paris, 1969. 96 F.

This book is directed primarily to the non-mathematician who seeks "dans l'approche scientifique de problèmes nés des sciences humaines, une source de développements mathématiques originaux venant en quelque sorte prendre le relai de cette source d'inspiration déjà ancienne que constitue le monde matériel." It is intended to provide "un langage qui tout en ayant la rigueur qu'exigent les mathématiques, soit adapté aux besoins de ceux qui se préoccupent de mieux comprendre et de mieux maîtriser les phénomènes du monde économique et social; des concepts, des résultats, des algorithmes qui, tout en étant adaptés à la résolution de problèmes concrets, s'insèrent déjà dans une théorie où soient susceptibles d'en constituer l'amorce." In the opinion of this reviewer, the book is admirably suited to this purpose. The presentation is polished, yet readable. There are many fine illustrations and worked examples, the latter emphasising concrete applications.

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