The first chapter, after a brief outline of the relevant set theory, begins with a definition of a complete information game, which will be presented here to give an indication of the flavour of the book. It is a set X (positions of play) which is a finite disjoint union of subsets $\{X_i\}_{i \in N}$ (N the set of players) and a function Γ (the rules) such that for each $x \in X$, $\Gamma(x)$ is a subset of X. There are n quasi-orderings $R_1, \ldots, R_n$ on X (R_i is the preference relation for player i, and is often described by means of a real function f_i) and the set N has a partition $N = N^+ \cup N^-$ (the active and passive players). If $x \in X_i$, then player i chooses $y \in \Gamma(x)$.

Without describing the contents in detail, we have, in chapter one, conditions of equilibrium of complete information games. Chapter two introduces topological notions. The third chapter deals with information schemes, combined strategies and behaviour strategies. The fourth gives the fundamental equilibrium conditions for simultaneous games and the fifth discusses coalitions, imputations and the Shapley function.

All this is compressed into 109 pages. In his preface the author states that he writes for those who know no more than the elements of algebra and set theory, and a little topology for chapters two and four. He might have added that mathematical maturity is also required, for this is not a book for the beginner. There are few misprints, but the lemma on page 98 is false as stated. With a multiplicity of new notions, some defined on almost every page and some perhaps not at all, an index of terminology is sorely missed.

J.E.L. Peck, McGill University

The Structure of Arithmetic and Algebra, by May Hickey Maria. John Wiley and Sons, New York 1958. xiv + 294 pages. $5.90.

According to the preface, this book is "an elementary axiomatic development of the real number system. Its aim is to make available to the non-science student and to the teacher of secondary school mathematics the fundamental concepts that underlie the structure of algebra and arithmetic." It seems to have been designed to fill the gap between Landau's Grundlagen der Analysis and the so-called "popular" treatments of the subject.

The book treats the ordinary operations of arithmetic, the order relation, a bit of high school algebra (more or less carefully presented), the positive integers, the continuity property of the real number system, and number notation. The exposition is painstakingly detailed.

One of the features of the text is an elaborate code which is used to refer to certain axioms, definitions, and theorems. For example, TIr is the Theorem on Irrational Numbers, which runs as follows: "If a non-zero rational number r is combined with an irrational number p by any one of the four operations of arithmetic, the result produced is an irrational number; in symbols, r + p, r - p, p - r, rp, r/p, p/r are irrational numbers." According to the author's preface, "Experience in classroom teaching shows that the students use the code with alacrity and effectiveness in making full and concise proofs."

This reviewer feels that the book under review is a worthy addition to the literature; but on the whole he found the exposition somewhat clumsy. In a few places terms are used before they are explained (e.g. "empty set," page 99) and in some places no explanation is offered where one is clearly required. (e.g. 0! is used, but never defined. Since 3! is defined, the reviewer presumes that no knowledge of factorials is assumed.) Functions are never mentioned, even though the use of functions could have simplified the treatment considerably. These objections, however, may possibly be regarded as minor. Finally, the exercises in the book are many in number and generally non-computational in nature.

Robert R. Christian, University of British Columbia

<u>An Introduction to Functional Analysis</u>, by Angus E. Taylor. John Wiley and Sons, New York, 1958. 423 pages. $12.50.

This book is intended primarily as a text for graduate students. The majority of it is taken up with development of the basic abstract theory of linear spaces and operators. This material is interspersed with many examples, and each chapter begins with an introduction which gives some motivation and points out the most important results. The numerous exercises are a valuable feature.

The first chapter is concerned with the purely algebraic aspects of vector spaces and linear operators. There is a concise review of the finite dimensional case and several examples of infinite dimensional spaces and operators on them. It is pointed out how classical problems such as the existence and uniqueness of solutions for linear integral or differential equations can be formulated in terms of linear operators. The algebraic dual of a space and transpose of an operator are discussed, as well as algebraic (Hamel) bases.

The second chapter is a concise introduction to general topology, with concentration on what is needed for linear analysis. For example, completion of a metric space and Baire

https://doi.org/10.1017/S0008439500025315 Published online by Cambridge University Press