87[G, H, X].—F. A. FICKEN, *Linear Transformations and Matrices*, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1967, xiii + 398 pp., 24 cm. Price $10.50.

In spite of many entertaining historical digressions, this is a tight book. Much ground is covered. It is assumed that the reader knows only elementary Cartesian geometry and trigonometry. So the early chapters start out with set theory, mathematical induction, propositions, the real numbers, order, vectors in three dimensions, groups, isomorphism, and related notions. Chapter 5, "Linear spaces," deals with linear dependence and bases. Chapter 6 is on "Linear transformations," and duality enters in Chapter 7. Determinants arise in Chapter 11. The Jordan canonical form comes in the next chapter, and Chapter 14, the last, deals with "Similar operators on a unitary space." Interspersed are 760 exercises (by the author's count), and at the end are seven pages of bibliography, carefully classified, 31 pages of "Selected answers and hints," three pages for an index of symbols, and an index of eight pages.

The book has developed through in-training courses given at the Gaseous Diffusion Plant in Oak Ridge, and courses given at the University of Tennessee and at New York University. Generally, these have been three-quarter courses. Throughout, the emphasis is on geometry and applications, hence, so far as possible, on coordinate-free representation.

The phraseology is meticulously precise and highly literate (by contrast with much current literature). To teach to the audience intended would be pleasant but possibly demanding. For readers of this journal it should be remarked that little attention is given to computational techniques, but this is a subject in itself.

A. S. H.

88[G, H, X].—ANDRÉ KORGANOFF & MONICA PAVEL-PARVU, *Éléments de Théorie des Matrices Carrées et Rectangles en Analyse Numérique*, Dunod, Paris, 1967, xx + 441 pp., 25 cm. Price 98 F.

This is the second book of a series, and it must be said at the outset that this book is at a level quite different from that of its predecessor. For a reading of Volume 1, little was required beyond reasonable mathematical maturity. The present volume is divided into two parts, entitled "Vectorial algebras and normal algebras of matrices," and "Inverses of rectangular matrices," and it begins with Chapter 1.1, whose title may be translated as "Recollections of functional analysis" (the first word is "rappels," and there is no strict English equivalent). The point is simply that many theorems are stated without proof. The other two chapters, covering a total of nearly a hundred pages, deal with norms. And still the proofs are minimal or omitted altogether. We are promised a third volume that will, presumably, fill the gaps.

The main theme occurs in the second part, and is easily recognized as the "pseudo-inverse" (as the authors call it), the "generalized inverse" (as it is often designated), or the "general reciprocal" (in the phraseology of E. H. Moore, the inventor). The fact that the treatment extends to more than 250 pages indicates the amplitude of the development.

There are three separate bibliographies, one "general," and one for each "part." There is no index. There are numerical examples. It is a book only for the mathe-