Algebră Superioară (Higher Algebra), by Gh. pic. Editura Didactică si Pedagogică, Bucarest, 1966.

This book, written in Rumanian, contains material taught over the past ten years at the universities in Cluj and Bucarest to first year students in the analysis course. In part it covers the curriculum laid down by the Ministry of Education for the programme in analysis. The book contains 478 pages on good paper between hard covers and costs 21, 80 Lei, which at tourists' rate of exchange is $1.21. (American).

Professor Pic, who lectures at the Babeş-Bolyai University in Cluj, told me that the first seven chapters, which are entitled, Fundamental Structures of Algebra, Determinants and their applications, Elements of the Theory of Matrices, Vector Spaces, Linear Transformations, Bilinear, Hermitian and quadratic forms, and The existence of roots of a polynomial and its consequences, and are contained in pp. 5-284, form the core of the first year algebra for analysts. This core is usually supplemented by material from the remaining six chapters: Resultants (of polynomials), Transformations of equations, Abelian equations, Separation of roots, Geometry of polynomials, Effective methods for calculating the roots of a polynomial.

These latter chapters provide a large body of information about polynomials and their roots which, to the reviewer's knowledge, is not available in any other text on this level. The proofs are all of an elementary nature which would be fully understandable to a second year mathematics student in Canada (were he in possession of a Rumanian-English dictionary). In Chapter 7, Professor Pic gives an elementary proof of the Fundamental Theorem of Algebra in which he uses only simple facts about real numbers.

The first six chapters provide good foundation in the fundamental notions of algebra, in general, and linear algebra, in particular. Some of the topics included are group rings, fields, lattices, isomorphism, homomorphism, vector spaces, proper values and proper vectors of a linear transformation, and canonical forms to name but a few.

Professor Pic's book is an indication of the high level of mathematical education achieved in the universities of the Socialist Republic of Rumania.

B. Brainerd, University of Toronto

Elementary Vector Algebra, by A.M. MacBeath. Oxford University Press, Toronto, 1966. 136 pages. $2.10. (Canadian).

This little book is a careful and thorough account of vector algebra in 3-dimensional euclidean space with applications to the geometry of straight lines, planes, and spherical surfaces. To quote from the Preface: "The approach is geometrical and non-axiomatic, intuitively acceptable properties of 3-dimensional euclidean space being assumed without proof

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and sometimes even without explicit statement". The vector algebra goes as far as the vector and scalar triple products and the geometrical applications include derivations of several trigonometric identities.

The exposition is very clear, great care being taken to resolve every possible source of misunderstanding, and the book is therefore well suited to individual study. There is a liberal supply of exercises with their solutions. There are few prerequisites other than the algebra of real numbers, and the book may be very appropriate for use in the final years of High School mathematics and as an additional text for freshman courses, where the subject matter of this book is usually notable by its cursory treatment.

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Peter Lancaster, University of Calgary
and California Institute of Technology

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The Algebra of Abū Kāmil (Kitāb fī al-jābr wa'l-muqābala) in a Commentary by Mordecai Finzi. Hebrew text, translation, and commentary with special reference to the Arabic text, by Martin Levey. The University of Wisconsin Press: Madison, Milwaukee, and London, 1966. xiii + 226 pages. $10.00.

Abū Kāmil's book on algebra is the first Arabic work on algebra following al-Khwārizmī's well-known text (ca.830). As his forerunner, abū Kāmil (850? - 930?) discusses the theory of equations of the first and second degree, and in a way his "Algebra" is a commentary on and elaboration of that of al-Khwārizmī. While the latter had discussed 40 problems, abū Kāmil increased the number to 69 taking over many from al-Khwārizmī and adding further solutions to those contained in the earlier work. More important is the improvement which results from abū Kāmil's attempt to combine the practical Babylonian viewpoint with the theoretical attitude of the Greeks. In this connection one should expect to find a comment on the claims put forward by Aydin Sayili in his edition "Logical necessities in mixed equations, by 'Abd al Hamīd ibn Turk and the algebra of his time" (Ankara, 1962) who argues that the "Algebra" of al-Khwārizmī was a shortened version of that of ibn Turk. But ibn Turk who hence may have preceded al-Khwārizmī isn't even mentioned.

The present volume contains side by side with the English translation the Hebrew text of the commentary on abū Kāmil's book by Mordecai Finzi (written in the 15th century) rather than the original Arabic. A copy of this is also extant but is much inferior to the Hebrew version. There is an introduction of 25 pages, footnotes, a Hebrew-English glossary of mathematical terms, an index and last but not least, a concordancy of the problems which Leonardo Fibonacci of Pisa borrowed from abū Kāmil for his "Liber abbaci", (1202).

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C.J. Scriba (Hamburg)

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