where A is a square matrix (box) with irreducible characteristic polynomial, and E is the identity matrix of the same dimension.

Besides conventional material, Chapter IV includes a discussion of "Matrices permutable with given matrices", and "Matrices permutable with every matrix that is permutable with A". The proofs in these sections are of moderate length, and in a pleasant style. The author mentions that a transformation permutable with every endomorphism of the n-dimensional space must be scalar; the same conclusion follows if "endomorphism" is replaced by "isomorphism".

The author's treatment of inner product spaces, of the structure of unitary, symmetric, antisymmetric, and complex-symmetric transformations is thorough. Besides this, the chapter on linear transformations of bilinear metric spaces is superb, and gives a clear exposé as well as a satisfying motivation of the Wellstein theory. The last 50-page chapter on multilinear functions and tensors is more than an introduction to the subject; it is a revelation of some of its aspects.

The translators have appended a brief index.

Joel L. Brenner, Stanford Research Institute

Linear Algebra and Matrix Theory, by Evar D. Nering. John Wiley and Sons, Inc., New York, 1963. xi + 289 pages.

The chapter titles are: I Vector spaces. II Linear transformations and matrices. III Determinants, eigenvalues, and similarity transformations. IV Linear functionals, bilinear forms, quadratic forms. V Orthogonal and unitary transformations, normal matrices. VI Selected applications of linear algebra. The applications in Chapter VI are a feature of this book. They include: vector geometry (with some mention of convex sets), finite cones and linear inequalities, linear programming, the finite sampling theorem in communications theory, spectral decomposition of a linear transformation, systems of linear differential equations, small oscillations of mechanical systems, and representations of finite groups by matrices. This material accounts for one quarter of the book.

The author states that "the underlying spirit of this treatment of the theory of matrices is that of a concept and its representation". This theme is kept constantly before the reader. It is emphasized that matrices can and do represent different things in different contexts, and that formal manipulation of matrices without an understanding of the underlying concepts can lead to disaster.

https://doi.org/10.1017/S0008439500024401 Published online by Cambridge University Press

The general treatment is a good one. The proofs are often elegant; and an excellent supply of computational exercises and theoretical problems mesh well with the text. The book is well and carefully written. The reviewer feels, however, that the average student beginning this subject will find some difficulty in reading parts of it. This will depend to some extent on his mathematical sophistication. There is, for example, no gentle introduction to vector spaces through a preliminary discussion of 2- or 3-dimensional spaces. Set notation, the definition of a field, and that of an abstract vector space are given in rapid succession in the first three pages. Chapter VI is more compact, and proceeds at a faster pace, than the preceding chapters.

A few misprints were detected, all trivial. Some finicky observations: In the proof of Theorem 7.1 on p. 166, the right side of equation (7.2) may have only one non-zero term if $a_{ii} = 0$. In Exercise 15, p. 177, could there not be a stray one and/or minus one on the principal diagonal?

B.N. Moyls, Cambridge, Mass.

Regular Polytopes, by H.S.M. Coxeter. Second Edition. Macmillan, 1963. xxii + 321 pages.

This excellent book has now been issued in paperback form, with a few changes since the first edition.

On page 74 the number h of sides of the Petrie polygon of $\{p, q\}$ is expressed rationally in terms of p and q. On pages 228-232 there is a direct proof that the number of reflections in a symmetry group generated by four reflections is not less than 2h. These improvements result from recent work by R. Steinberg.

Several figures have been re-drawn, and the plates have been enlarged in accordance with a somewhat larger page size. The bibliography has been brought up to date.

The author's "fifteenth chapter", Regular Honeycombs in Hyperbolic Space, may be found in the Proceedings of the International Congress of Mathematicians, Amsterdam 1954, Volume III, pp. 155-169.

Reviews of the first edition appeared in Mathematical Reviews 10 (1949), pp. 261-262, and the Bulletin of the American Mathematical Society 55(1949), pp. 721-722.

P. Yff, University of Toronto