In the first chapter Venn diagrams are used to introduce the algebra of sets in an intuitive manner up to the point of solution of equations in Boolean algebra. This approach is formalised in the second chapter on an axiomatic basis and extended to the realisation of a Boolean algebra as a symbolic logic (Chapter 3). There is a large number of examples and exercises ranging from routine computations to problems in logic of the kind devised by Lewis Carroll.

Chapters 4-6 are a detailed application of Boolean algebra to switching circuits, specifically circuits involving two-state devices such as simple switches, relays, diodes, etc. Beginning from simple series-parallel circuits the algebraic methods are extended to deal with more general 'bridge' circuits and it is shown how these methods assist in the design of circuits with a given output function. The use of relays (or similar devices) makes feedback and 'memory' possible; then sequential circuits (circuits with various given outputs in sequence) and recycling circuits can be constructed. Finally, Chapter 6 discusses some circuits which will perform arithmetic operations on binary numbers.

The book is carefully written and particular care is taken to clarify the basic logical and mathematical concepts. The numerous examples and exercises (with some answers) help to make this a useful introduction to the applications of Boolean algebra.

J. D. Dixon, McGill University

Numerical Methods for Science and Engineering by Ralph G. Stanton. Prentice-Hall, Englewood Cliffs, New Jersey, 1961. 266 + xii pages.

This book is written as a text for a first course in numerical analysis suitable for science and engineering students with a background of calculus and co-ordinate geometry. It is based upon the author's experience in preparing and teaching such a course to Engineering Physics students in their second year at the University of Toronto.

The first three chapters of the book are concerned with the inevitable finite difference notations and formulae, including a nine-page section on least squares. In this connection, a significant and interesting distinction is drawn between problems of curve-fitting and regression. These chapters might well have included a discussion of the propagation of errors in a difference table, and of the use of such tables for checking the accuracy of tabulated functions. The fourth chapter is concerned with the solution of equations, especially polynomials, and includes discussions of inverse interpolation, regula falsi, and Newton's method. The problems posed by multiple or near-multiple roots and complex roots are squarely faced and discussed in some detail. In nearly every case, graphs or tables of the polynomial are used to obtain initial estimates of roots. The fifth chapter deals with the summation of series and the evaluation of definite integrals by finite difference methods. It includes sections on the Euler transformation, asymptotic expansions and the Lagrange series. The remainder of the book treats problems of linear algebra notably matrix inversion and the solution of linear systems, and problems in ordinary and partial differential equations. Initial-value problems in ordinary differential equations are undertaken by expansions in series, and the methods of Picard, Adams-Bashforth, Milne, and Runge-Kutta. In view of the fact that the phenomenon of ill-conditioning is mentioned in connection with matrix problems, and an interesting means of estimating the condition of a matrix is given, it would seem reasonable to have included a discussion of instability with respect to the methods of Adams-Bashforth and Milne. Certainly numerical examples of unstable recurrence formulae may be found to illustrate the unfortunate consequences of the careless application of these techniques. After some preliminary discussion of determinants and matrices, the methods of elimination, relaxation and Gauss-Seidel, are described for the solution of linear systems. In the same context, the power method for the determination of eigen-values and vectors is described. It is unfortunate that the Jacobi method is not described at this point, as most of the eigenvalue problems met in practical situations are symmetric, and this method admits a simple presentation and justification. Finally, after a chapter on difference equations and the analogy between summation and integration, finite difference methods for the solution of ordinary and partial differential equations are introduced. This chapter is brief (16 pages); the method of solution used in most of the examples is relaxation. The book concludes with a chapter on the principles of automatic computation.

The chief virtues of this book are the clear and concise style in which it is written, the elegant way in which many formulae - e.g. the error formulae in finite difference integration procedures - are derived, the numerical examples employed to illustrate every method described, and the choice of useful and instructive exercises. It is oriented towards manual computation in one form or another and contains much practical advice on this art. Its only weakness is its treatment of automatic computation. It is debatable whether or not this topic should have been introduced at all - but once the decision to include it was taken, sufficient information on the organization of a computer and the preparation of programs should have been included, in the first chapter, to give the reader some feeling for, or understanding of, the sort of numerical procedure that is well-suited to automatic processing. Then this insight could have been developed, by examples, throughout the remainder of the text. In this book, the effort made in this direction has been entirely inadequate, and the author would have been justified in omitting this topic altogether from an excellent presentation of manual methods.

In the balance this book is admirably suited to the purpose for which it was written. It is recommended to every scientist and engineering student who seeks a clear, straightforward exposition of the fundamentals of numerical analysis.

James L. Howland, University of Ottawa

Elements of Linear Algebra, by L. J. Paige and J. D. Swift. Ginn and Co., Boston, 1961. xvi + 348 pages. $ 7.00.

This book is an introduction to the subject of linear algebra, intended for sophomore or junior classes. The contents reflect the authors' opinion of what is most desirable in an initial university course in algebra for majors in mathematics and mathematically inclined students in the sciences and engineering.

Chapter 1 is an introduction dealing with the following topics: set notation; some of the basic properties of the real numbers (including a list of postulates for an ordered field); mappings; and some types of proof which arise in mathematics.

In Chapter 2 the student is introduced to vectors by way of 3-dimensional analytic geometry. Vectors are brought in as triples associated with lines. Some of their basic properties are derived; and the following topics are treated: linear dependence, systems of linear equations, inner product, length, and outer product. All of this is done in 3-dimensional Euclidean space where the student can relate new concepts to geometrical properties which he can visualize.

The algebraic ideas of Chapter 2 are extended to general vector spaces in Chapter 3, and the geometric notions are developed in Chapter 4. All vector spaces are real.

Chapter 5 is devoted to determinants. These are introduced as multilinear functionals; and the standard properties are discussed.

Chapter 6 is concerned with linear transformations. Matrices are introduced as representatives of linear transformations; and their algebra is developed.