6 [4].—SANFORD M. ROBERTS & JEROME S. SHIPMAN, *Two-Point Boundary Value Problems: Shooting Methods*, Elsevier, New York, 1972, xiv + 269 pp., 24 cm. Price $16.50.

This is the only text on the use of shooting methods to solve boundary value problems and, as a consequence, contains information and references not readily available elsewhere. It is a useful book, but it is not easy to read nor should its advice be accepted uncritically.

The level and presentation are quite uneven. The excessively long treatment of the methods of adjoints and of complementary functions would have been both shorter and clearer using vectors. In contrast, portions of the book make serious use of functional analysis. A good many sections leave the impression of being partially digested research papers. The authors are not successful in their goal of using Newton's method to clarify equivalences and relations among a collection of apparently different procedures. There is undue redundancy and quite a bit of material could have been dropped profitably as unimportant. On the other hand, some really important topics like Conte's method and multiple shooting are only sketched. It is curious that multiple shooting is not even classed as a shooting method and appears in the chapter on finite-difference methods.

To understand shooting methods, it is essential to understand the implications of the stability of the initial value problem (cf. their comments about initial conditions on p. 176). The authors spend only a couple of paragraphs on this and several pages on an irrelevant "review" of stability of some methods for numerically solving initial value problems. To use shooting methods, it is essential to have a first class code for the initial value problem. It appears that the authors used a fixed step, fourth order Runge-Kutta code in their examples. Far more attention ought to have been devoted to this matter and to other computational matters such as the storage question when solving nonlinear problems. Codes would have been desirable.

L. F. SHAMPINE

Department of Mathematics
University of New Mexico
Albuquerque, New Mexico 87106

7 [6].—JAMES ALAN COCHRAN, *Analysis of Linear Integral Equations*, McGraw-Hill Book Co., New York, 1972, xi + 370 pp., 24 cm. Price $15.95.

This book consists of a collection of important results in the theory of linear, nonsingular integral equations. The topics covered include the standard material found in most texts on integral equations as well as more recent and less accessible results. Chapters 1 to 6 cover the classical topics: Fredholm integral equations via the Schmidt theory and the Fredholm-Carleman theory, eigenvalue problems and Volterra equations. The eigenvalue problem for hermitian kernels is studied in more detail in Chapters 7 to 13. Various existence proofs are given and techniques for obtaining upper and lower bounds by the Rayleigh-Ritz procedure and the Weinstein-Aronszajn method are discussed. The last five chapters deal with the properties of non-hermitian kernels of certain types, such as nuclear and composite kernels, positive, anti-hermitian and symmetrizable kernels. Wiener-Hopf equations are briefly dealt with in the last chapter.

The book is definitely intended for the applied mathematician. While there are relatively few examples arising directly from physical problems, the selection of topics reflects the book's aim toward applications. The author has avoided highly abstract formulation and thus made the book available to a large class of readers. It is suitable also as a text for a graduate course in integral equations; the interesting exercises at the end of each chapter contribute to this aspect.

A wide variety of topics is covered in a little over 300 pages; thus the treatment is occasionally brief. However, an extensive, up-to-date bibliography helps to direct the interested reader to the appropriate research papers and more detailed coverage. The main strength of the book is that it brings together a number of important topics in integral equations in an easily accessible form. This alone should make it a useful addition to the collection of the applied mathematician.

PETER LINZ

Department of Mathematics
University of California, Davis
Davis, California 95616

8 [7].—C. WILLIAM MARTZ, *Tables of the Complex Fresnel Integral*, Report NASA SP-3010, Scientific and Technical Information Division, National Aeronautics and Space Administration, Washington, D.C., 1964, v + 294 pp., 27 cm. Copies obtainable from the National Technical Information Service, Operations Division, Springfield, Virginia 22151. Price $4.00.

The title is somewhat misleading, since the tabulation is actually that of the function

$$E(z) = R(z) + iI(z) = \int_0^z \exp\left(\frac{i\pi}{2} u^2\right) du.$$

On the other hand, the complex Fresnel integrals are defined by

$$C(z) = \int_0^z \cos\left(\frac{\pi}{2} u^2\right) du = C_1(z) + iC_2(z),$$

$$S(z) = \int_0^z \sin\left(\frac{\pi}{2} u^2\right) du = S_1(z) + iS_2(z).$$

Hence, to obtain the latter quantities from the tables one must use the relations

$$C_1(z) = [R(x + iy) + R(x - iy)]/2,$$

$$C_2(z) = [I(x + iy) - I(x - iy)]/2,$$

$$S_1(z) = [I(x + iy) + I(x - iy)]/2,$$

$$S_2(z) = [-R(x + iy) + R(x - iy)]/2.$$

In these 5S tables (without differences), y extends over the range $-2.60(0.02)1.82$, while the range of x is variable, depending on the current value of y. For $y > 0$, the