Mathematical Theory of Reliability. By R. E. Barlow and F. Proschan, with contributions by L. C. Hunter. Wiley, New York (1965). xiii+256 pp.

The authors have produced a scholarly monograph which deserves the attention not only of the specialist in reliability theory but of anyone interested in the application of probability theory to an extensive and important group of practical problems. One of the unifying themes is the concept of monotone failure rate, which turns out to be a special case of total positivity, a concept which has had extensive application in probability, statistics, economics, and mechanics. One appendix is devoted to properties of totally positive functions, and a second gives a statistical test for determining if a sample comes from a population having a monotone failure rate.

The introductory chapter gives an informative historical background and points out how several basic concepts previously introduced (e.g. interval reliability, pointwise availability, interval availability, etc.) are all special cases of the expected value of the payoff of a vector-valued random variable. Succeeding chapters deal with: failure distributions, maintenance policies (operating characteristics and optimization), stochastic models for systems having several states, redundancy optimization, and finally an extension of the work of von Neumann, Moore and Shannon on the construction of reliable systems from unreliable components.

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Theory of Ordinary Differential Equations. By R. H. Cole. Appleton-Century-Crofts, New York (1968). xi+273 pp.

This book provides a transition from the bag-of-tricks to the functional-analytic treatment of linear differential equations. It is accessible to students who know some matrix theory and calculus and is sufficiently self-contained that it could be used for self-teaching.

The author's use of the contraction mapping principle permits a relatively uncluttered presentation of basic existence theory. Similarly, results for n-th-order equations are elucidated by first treating, in matrix notation, systems of first order.

There are ten chapters, the first five of which are devoted to the existence and construction of solutions. (Except for the general existence theory the book treats only linear equations.) The constant-coefficient case is solved via the Jordan canonical form for matrices. The analytic-coefficient case is solved via power series.

The latter five chapters deal with boundary value problems. Chapter 6 (the longest) includes the most lucid treatment of Green's functions, on this level, of which I am aware. The spectral theory for self-adjoint equations is treated as an