and informative, it leaves the reader with a curious sense of being a spectator and not a participant.

The *LINPACK user's guide* is at the opposite extreme. At its core are 129 pages 'listing' 50 subroutines. These are written in standard Fortran and are also available on magnetic tape, hence easily executable at most computing centers. The *Guide's* main purpose is to document these programs. Written for computing professionals, it has the same sparkle as a manual explaining to expert repair mechanics the workings of an automobile engine.

Yet it is an important and meaty document, giving an authoritative picture of current mathematical software technology. Its programs have been exhaustively tested at a number of computing centers on a variety of machines, and can be certified as optimal (in the present state of the art) for solving many problems of linear algebra. Many millions of dollars of computing and programming time will be saved by using them! (The best direct and iterative methods for solving discretizations of linear elliptic boundary value problems are *not* included, however.)

Though the three books differ in most respects, they share a weakness: none of them points out the *limitations* of the methods that it explains. Thus the *LINPACK user's guide* nowhere mentions the fact that the rank of a general matrix cannot be computed in 'real arithmetic'; Nash does not comment on the possibility that his minimization algorithms fail for some functions (e.g. for $2x^2 - \pi x - 5 \exp[-(10^3 x)^2]$). Even Henrici, whose skillfully written programs would surely have delighted Euler or Gauss, fails to observe that the coefficients of his power series are not expressed on a computer as rational numbers, hence cannot easily be recognized as generating functions.

By making allowances for this minor weakness, the curious reader who browses through these books can acquire a realistic picture of the state of numerical mathematics today.

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Topologie und analysis, by Bernhelm Booss, Springer-Verlag, Berlin, Heidelberg, New York, 1977, xiv + 352 pp., $17.50.

The Atiyah-Singer index theorem; an introduction, by Patrick Shanahan, Lecture Notes in Math., vol. 638, Springer-Verlag, Berlin, Heidelberg, New York, 1978, v + 224 pp.

At the beginning of the twentieth century, mathematics had been greatly enlarged by the ideas of a number of giants, including Riemann, Cantor, Poincaré and Hilbert. Considerable effort was then expended on understanding and developing the whole new areas of mathematics which had been created. And this plus the general trend toward axiomatization meant that a parochial view largely dominated mathematics. In the last couple of decades, however, that has changed and some of the most exciting developments have come from the interaction, often in unexpected ways, of different parts of