ence, it is the best approach to this situation," a remark that is likely to be appreciated by the many people who find that they are suddenly involved in Chebyshev approximation although they have neither training nor experience in the field.

Chebyshev approximation is an example of a branch of numerical analysis that has flowered in recent years as a result of the availability of high-speed, cheap, and reliable computing. The number of ideas and the number of specific details of importance in practice that are now known (as well as some of the pitfalls) are sufficient to occupy a whole course. The idea of Chebyshev approximation, minimizing the maximum error, not only fits in well with computing but is the basis for the mathematical theory of games and is the dominant idea behind much of the current military and economic planning, so the course is not necessarily one for an isolated technician in computing.

Numerical analysis is a curious balance of two forces, the desire for mathematical rigor so that one knows what should happen to him when he acts on the results of perhaps millions of arithmetic operations done on a high-speed computer, of the details of which he can have only the slightest ideas, and the necessity for practical guidance that what he has done is a sensible, reasonably efficient thing to do and has more than mere theoretical justification. After many years the field is gradually finding a balance between the two forces, although books representing the extremes still appear now and then.

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Organic Chemistry

Carbocyclic Non-Benzenoid Aromatic Compounds. DOUGLAS LLOYD. Elsevier, New York, 1966. 230 pp., illus. $13.

Present efforts in the field of non-benzenoid aromatic chemistry represent one of the best examples of the impact theoretical chemistry has had on organic chemistry. Using the molecular-orbital and valence-bond concepts of structure the organic chemist has been aided in the planning and carrying out of syntheses of many important compounds. With the accumulation of over 100 articles a year in this rapidly expanding field, Lloyd's book is a welcome and highly useful review.

In the first chapter an attempt is made to define the terms "aromatic," "non-benzenoid aromatic," and "pseudoaromatic." Because of poor usage in the past, the meanings of these terms have been somewhat distorted. Lloyd's historical approach to defining them, although it does not solve the problem conclusively, will encourage workers to use them more precisely. The remaining chapters take up specific classes of carbocyclic non-benzenoid aromatics, derivatives of cyclopropene, cyclobutadiene, cyclopentadiene (including ferocene), tropylium salts, tropones and tropolones, and medium to large ring systems. The last chapter is concerned with several other polycyclic systems (for example, azulene), as well as the pseudoaromatics pentalene and heptalene.

The book reads well and covers the synthetic aspects of the subject rather completely, although I found a few minor omissions.

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Statistical Method

Applied Regression Analysis. N. R. DRAPER and H. SMITH. Wiley, New York, 1966. 417 pp., illus. $11.75.

This book is based on a set of class notes for a short course for the American Society for Quality Control, originally prepared by the authors in 1962 and subsequently extended and revised. The bulk of the book is concerned with the computation and interpretation of multiple linear regression, but there is a section on nonlinear estimation which appears to have been added to the original manuscript (it has, for example, a separate bibliography), and one on the application of linear multiple regression to analysis of variance. But the essential feature of the book is the treatment (covering some 240 pages) of linear regression.

This is extremely well done. The authors have combined an easily understandable explanation of practical method with an adequate and sound theoretical background. One feature of interest is that the text assumes that results of calculations will usually become available in the form of computer output. Many examples and exercises thus have an appearance (with a uniform 7 decimal places shown) which is rather strange to one used to reading more conventional texts. Another feature both unusual and welcome in a book of this kind is the systematic use of matrix notation. The meaning of this notation is clearly explained. Indeed, the authors seem to go rather too far in protecting their readers when they decide not to expose them to an actual definition of the value of a determinant—they call it "a quantity which we shall not define here but of which we shall provide some examples" (p. 47). Particularly valuable chapters are those on "The examination of residuals" (chapter 3), "Selecting the 'best' regression equation" (chapter 6), and "Multiple regression and mathematical model building" (chapter 8). This last chapter is so interesting that one could wish it were much longer than ten pages. Chapter 6 discusses an important problem and provides lucid explanations of procedures used in current practice. Where the authors give their opinion on the usefulness of a procedure, the relevant paragraph is clearly labeled OPINION; I found this most helpful in recognizing points at which results of personal experience were stated, as opposed to generally accepted facts.

The final chapter, "An introduction to nonlinear estimation," is rather more complex than the remainder of the book but is also very clearly written. It includes a section on the geometry of linear least squares, which is relevant to the earlier part of the book, and contains some unusually fine pictorial representations of solid geometry. The dependence of the method of steepest descent on choice of scale—in fact *any* direction (apart from signs) can, in general, be obtained by appropriate choice of scale—is, unfortunately, not given as much emphasis as it deserves. Another place where there is some unnecessary confusion is on page 71 where "sequential F-test" is used to describe a sequence of F-tests on a given set of data. It is admitted that "some writers dislike" this, but the reason (that of possible confusion with "*genuine* sequential F-test") is not mentioned. However, blemishes such as this are few, and not serious enough to affect the value of this book as an outstanding means of obtaining operationally effective command of the techniques of regression analysis.

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