changed to a zero; i.e. the instruction acts exactly as if it were a TO LIST instruction in this case.

LINK (cell, index, label)

If the cell after the specified cell is a ptc then it is returned to the Available Space List, the link of the specified cell is set to zero, and the LINK instruction then behaves in the normal manner, assuming the specified cell is the last cell of a list. If the specified cell is a ptc (normally this would indicate some error) then the name of the cell is left in the index, and the jump occurs. (On Mercury the B test register is set > 0.)

NEWCELL (index)

The newcell produced is marked as a ptc by setting 1 in its link.

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Book Review

Solutions Numériques des Équations Algébriques, by E. Durand. (Paris: *Masson et Cie*, 1960, pp. 328, 65 N.F.)

Although the title of this book would lead one to believe that it is concerned exclusively with algebraic equations, it is in fact devoted to the solution of single equations in one variable and both algebraic and transcendental equations are treated. As far as algebraic equations are concerned, it is generally assumed that the relevant polynomials are given explicitly; the algebraic eigenproblem, in which the polynomial is expressed in determinantal form, is to be covered in a second volume.

Chapter 1 deals with expansions in power series, the inversion of power series, expansions in continued fractions and similar topics. The methods described here are not likely to be very widely used in practice. Chapter 2 gives a general survey of iterative methods with special reference to first, second and third order processes. The problem of multiple roots is treated in some detail. Chapter 3 is devoted to transcendental equations and discusses the use of iterative methods, particularly that of Newton, and inverse interpolation using the Bessel, Everett and Stirling formulae.

Chapters 4, 5, and 6 are of a more theoretical nature. Chapter 4 discusses the division of polynomials by linear and quadratic factors, the calculation of derivatives, the calculation of the greatest common division and the determination of a polynomial of degree n passing through n points. Chapter 5 is concerned mainly with transformations of polynomial equations and also includes a discussion of the variation of the roots with respect to changes in the coefficient, a most important consideration. Examples which have been used by the reviewer are given as illustrations. Chapter 6 covers the localization of roots by the rule of Descartes and by Sturm sequences. It also includes a most welcome elementary exposition of the Routh and Hurwitz stability criteria.

The book concludes with chapters covering the methods which are most commonly used in practice, those of Aitken–Bernoulli, Graeffe and the most useful of the iterative methods. The latter include the methods of Lin, Newton, Bairstow, Laguerre and Muller; the last of these is rather surprisingly classed as being of third order. The numerical examples presented in connection with the iterative methods are the most difficult of those given in the book. In a brief assessment of the various methods, the author declares himself in favour of the iterative methods when an automatic computer is available, and with this opinion I agree.

This is probably the most comprehensive book which is available on polynomial equations. I have for long taken the view that in spite of the important position occupied by the Fundamental Theorem of Algebra in mathematics, the practical problem of finding the zeros of polynomials is not very profound. The book therefore loses very little in presenting the subject-matter throughout in the most elementary terms possible, though some readers may like to supplement the material given here with some such work as Ostrowski's *Solution of Equations and Systems of Equations.*

Since the most important problem arising in practice is that of the condition of polynomials, I would have welcomed a discussion of the relevance of this to the accuracy attainable with the various methods. This is particularly true of deflation which is used in connection with most of the iterative processes. Another omission is the Quotient-Difference algorithms of Rutishauser, an assessment of which would have been very valuable. However, these are minor criticisms of a book which I am sure will prove popular with numerical analysts.   J. H. WILKINSON.