This unpublished table consists of the exact values of the integer coefficients ${}_{mn}A_{pr}$ and the coefficients to 5S (in floating-point form) of the error terms ${}_{mn}E_p$ for the discrete approximations

$$\frac{h^m}{m!}y^{(m)}(x_p) = \frac{1}{(n-1)!}\sum_{r=0}^{n-1} {}_{mn}A_{pr}y(x_r) + {}_{mn}E_p ,$$

where $x_r = x_0 + rh$, $p = 0(1)(n-1)$ for the ranges $m = 1(1)6$, $n = 7, 9$; $m = 5, 6$, $n = 8, 10$. The underlying calculations were performed on a CDC 3600 system.

An abridgement of Bickley's table [1] is given in the NBS *Handbook* [2]. The present authors have generated his entire table by the method of Gautschi [3] and thereby confirmed its accuracy.

The error term ${}_{mn}E_p$ can be expressed as ${}_{mn}e_p h^n y^{(n)}(\xi)$, where

$${}_{mn}e_p = -\frac{1}{n!(n-1)!}\sum_{j=0}^{n-1}(j-p)^n {}_{mn}A_{pj} .$$

For derivatives of even order the quantity ${}_{mn}e_{1/2(n-1)}$ vanishes, and the resulting symmetric formula is then accurate to an extra order of magnitude in h. Such error coefficients are identified in this supplementary table by an asterisk.

The authors include references to publications by Gregory [4] and Collatz [5]; however, they have not cited the relatively inaccessible tables of Kuntzmann [6], [7], which contain similar information for the first 10 derivatives.

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1. W. G. Bickley, "Formulae for numerical differentiation," *Math. Gaz.*, v. 25, 1941, pp. 19–27.
2. M. Abramowitz & I. A. Stegun, Editors, *Handbook of Mathematical Functions with Formulas, Graphs, and Mathematical Tables*, Dover, New York, 1965, p. 914. (See *Math. Comp.*, v. 20, 1966, p. 167, RMT **1**.)
3. W. Gautschi, "On inverses of Vandermonde and confluent Vandermonde matrices," *Numer. Math.*, v. 4, 1962, pp. 117–123.
4. R. T. Gregory, "A method for deriving numerical differentiation formulas," *Amer. Math. Monthly*, v. 64, 1957, pp. 79–82.
5. L. Collatz, *The Numerical Treatment of Differential Equations*, 3rd ed., Springer, Berlin, 1959.
6. J. Kuntzmann, *Formules de Dérivation Approchée au Moyen de Points Équidistants*, Report No. 1.373/1, Société d'Électronique et d'Automatisme, Courbevoie (Seine), France, 1954. (See *MTAC*, v. 10, 1956, pp. 171–172, RMT **51**.)
7. J. Kuntzmann, *Evaluations d'Erreur dans les Représentations Approchées de Derivées*, Société d'Électronique et d'Automatisme, Courbevoie (Seine), France, 1955. (See *MTAC*, v. 12, 1958, pp. 104–105, RMT **56**.)

78[X, Z].—Edmund C. Berkeley & Daniel G. Bobrow, Editors, *The Programming Language LISP: Its Operation and Applications*, The M.I.T. Press, Cambridge, Mass., 1966 (second printing), ix + 382 pp., 20 cm. Price $5.00.

This is a reprint of a collection of articles prepared several years ago by Information International for the Department of Defense. It was formerly available from the Department of Defense Documentation Center.

The LISP programming language was devised by John McCarthy in 1960 for symbol manipulation. It is based on function composition and evaluation according to Church's notion of lambda-conversion. Its data structures are in the form of lists of elements, with each element, which itself can be either an atom or a list, containing a pointer linking it to its successor. An ingenious scheme for automatic collection of unused words, together with convenient handling of recursive functions, relieves the programmer of most of the book-keeping.

Perhaps more important than the precise handling of the data structures is the fact that the program is stored in the form of such a structure, with the result that it can be manipulated by the program itself. Interpreters and compilers within LISP are simply functions which do such manipulation. In particular, the interpreter can be written in about a page of LISP. The simplicity of the interpretive process reflects the clarity of syntax and semantics in the language. Unfortunately, such clarity is not appreciated by the casual Fortran programmer, who soon tires of prefix notation for arithmetic and assignment operations and the innumerable parentheses. The latest version of LISP, LISP 2, will allow Algol-like notation, as well as more types of data structure.

LISP provides unquestionably the best existing introduction to nonnumeric programming. Although this book is far from ideal for teaching purposes, it is the only one available other than the LISP 1.5 manual, also by M.I.T. Press. The first five articles are tutorial in nature, including exercises and comments on debugging and programming styles. The second section contains descriptions of implementations for the Q-32 and M460 computers, articles describing applications of LISP to problems in logic and inference, and descriptions of extensions of LISP. Lengthy appendices contain code for a number of the papers. Three articles, the two by Saunders and the one by Hart and Evans, provide a reasonable introduction to LISP and its implementation.

As machines become faster, and it becomes apparent that mere speed does not solve the more significant nonnumeric problems, programming languages with the power and flexibility of LISP will become increasingly important.

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79[X, Z].—TORGIL EKMAN & CARL-ERIK FRÖBERG, *Introduction to ALGOL Programming*, Studentlitteratur, Lund, Sweden, 1965, 123 pp., 25 cm.

This informal exposition of all of Algol 60 is very carefully done and stresses elegance of expression in programming. The text contains many examples and there are about fifty exercises with solutions. Diagrams are used to explain conditional expressions and block structure, and as a unique feature, the book contains two photographs of some of the personalities behind Algol.

The first of the twenty chapters gives a brief history of computers and programming, Chapters 2–14 explain Algol programming, and the last six chapters deal with the following topics: The Algol report, peculiar and controversial features of Algol, the IFIP input-output primitives, the IFIP Algol subset, stack compilation of an arithmetic expression, and "the future of Algol."

A bibliography and a two-page index complete the book.

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