Table 3

Synthetic division by $p^2 + 0\cdot72p + 0\cdot01$

i	a_i	b_i	c_i
11	−0·0000 0001	−0·0000 0001	—
10	0·0000 0022	0·0000 0023 44	—
9	−0·0000 0346	−0·0000 0377 71	−0·0000 0004
8	0·0000 4410	0·0000 4907 52	0·0000 0099 52
7	−0·0004 3706	−0·0005 0035 05	−0·0000 1645 99
6	0·0032 3503	0·0038 6062 59	0·0002 1803 04
5	−0·0169 2388	−0·0215 2935 75	−0·0022 8318 07
4	0·0577 9053	0·0815 8855 75	0·0183 0820 88
3	−0·1148 8405	−0·1935 1063 43	−0·1081 2106 59
2	0·1216 7941	0·2610 3571 50	0·4477 6956 88
1	−0·1155 7791	0·0008 4482 34	−1·1142 2331 59
0	0·0694 2435	−0·0003 7359 63	1·0049 7338 34

We shall use $p^2 + 0\cdot72p + 0\cdot01$ as first trial factor. The calculation is set out in Table 3. Using equations (15) and (28), we deduce that

$$R_1 = 0\cdot0008\ 4482\ 34, \quad R_0 = 0\cdot0002\ 3467\ 65,$$

$$\frac{\partial R_1}{\partial A} = -1\cdot0049\ 7338\ 34, \quad \frac{\partial R_0}{\partial A} = -0\cdot0111\ 4223\ 32,$$

$$\frac{\partial R_1}{\partial B} = 1\cdot1142\ 2331\ 59, \quad \frac{\partial R_0}{\partial B} = -0\cdot2027\ 3259\ 60.$$

On setting up and solving equations (24), we get $\delta A = 0\cdot0020\ 0205$, $\delta B = 0\cdot0010\ 4753$, leading to a new trial factor $p^2 + 0\cdot7220\ 0205p + 0\cdot0110\ 4753$. A second iteration gives a factor $p^2 + 0\cdot7219\ 9137\ 45p + 0\cdot0110\ 4097\ 62$, which divides $s_n(x)$, leaving remainders which are negligible to the accuracy required. The zeros of this last factor are $p_1 = -0\cdot7063\ 6058\ 14$ and $p_2 = -0\cdot0156\ 3079\ 32$, and these in turn give the approximations

$$j_{11} \approx 3\cdot8317\ 0602,$$
$$j_{12} \approx 7\cdot0155\ 8693.$$

In this example, the derivatives $s_n'(j_{11})$ and $s_n'(j_{12})$ given by (29) are rather small—

$$s_n'(j_{11}) = -0\cdot1051,$$
$$s_n'(j_{12}) = 0\cdot0428.$$

Consequently, the error bounds given by (23) are large; in fact, for j_{11} we have $|e| \leqslant 0\cdot0000\ 0035$, while, for j_{12}, $|e| \leqslant 0\cdot0000\ 0076$.

References

CLENSHAW, C. W. (1954). Polynomial Approximations to Elementary Functions, *MTAC*, Vol. 8, p. 143.
CLENSHAW, C. W. (1955). A Note on the Summation of Chebyshev Series, *MTAC*, Vol. 9, p. 118.
ELLIOTT, D. (1968). Error Analysis of an Algorithm for Summing Certain Finite Series, *J. Australian Math. Soc.*, Vol. 8, p. 213.
ISAACSON, E., and KELLER, H. B. (1966). *Analysis of Numerical Methods*, New York: Wiley.
RALSTON, A. (1965). *A First Course in Numerical Analysis*, New York: McGraw-Hill.
SMITH, F. J. (1965). An Algorithm for Summing Orthogonal Polynomial Series and their Derivatives with Applications to Curve-fitting and Interpolation, *Math. Comp.*, Vol. 19, p. 33.

Book review

Methodes Numeriques, by Jean Kuntzmann, 1969; 192 pages. (*Hermann, Paris*, 36 Francs)

This workman-like monograph is a simple introduction to the important topic of Numerical and Computational Methods. It is one of the popular Hermann scientific series, written by a Professor at Grenoble University and includes computer orientated material suitable for understanding and using digital computers in both the numerical and non-numerical sense.

The first three chapters deal with some basic material concerning the processing of information inside the computer. Topics such as processing of symbols by algorithmic techniques, lists, flags, pointers, stacks, number ranges, binary system, syntax and semantics of algebraic expressions, Backus normal form, Polish notation, symbol strings, post fixed notation, compiling techniques, rounding errors in computer arithmetic, number systems, norms and interval arithmetic.

Chapter four gives a detailed but brief survey of computer methods for the solution of linear equations by the Gaussian elimination method with pivoting, condition numbers of systems of equations, polynomial interpolation, Lagrange, Newton, theory of differences, derivatives and integration, quadrature formulae and simple notions of differential equations. Chapter five deals with the principal sources of error propagation in numerical computation.

The final three chapters contain the basic principles of such miscellaneous topics as checking and supervision of obtaining numerical results, well known practical instruments of calculation and their usage and finally the construction of tables, their role, function and practical uses. Each chapter concludes with a number of exercises and their solutions to aid the reader.

This well written and attractively presented work fully deserves attention from computer scientists, mathematicians and engineers if only for the brief and refreshing way the subject matter is treated. It is written in French and so only suitable for those fluent in French or those of us who wish to take their medicine the hard way.

D. J. EVANS (Sheffield)