In summary, this book is a useful, understandable introduction to the engineering and testing of numerical software that faithfully and fairly reflects the present status of the field. While it necessarily includes some numerical analysis, it is not a numerical analysis text. I recommend it to anyone either interested in working on numerical software or simply curious about what is going on.

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1. W. J. CODY & W. WAITE, *Software Manual for the Elementary Functions*, Prentice-Hall, Englewood Cliffs, N. J., 1980.

2. J. J. DONGARRA, J. R. BUNCH, C. B. MOLER & G. W. STEWART, *LINPACK Users' Guide*, SIAM, Philadelphia, Pa., 1979.

28[60K05, 60K10, 65D07, 65D20, 65D30].—LAURENCE A. BAXTER, ERNEST M. SCHEUER, WALLACE R. BLISCHKE & DENIS J. MCCONALOGUE, *Renewal Tables: Tables of Functions Arising in Renewal Theory*, Technical Report, Graduate School of Business Administration, University of Southern California; 22 pages of typewritten text + 312 pages of tables xeroxed and reduced from computer printout sheets, deposited in the UMT file.

Let $\{N(t),\ t \geqslant 0\}$ denote an ordinary renewal process with inter-renewal distribution function F. In many applications of renewal theory, knowledge of the renewal function

$$H(t) = E[N(t)] = \sum_{n=1}^{\infty} F^{(n)}(t), \tag{1}$$

the variance function

$$V(t) = \text{var}[N(t)] = 2H^{(2)}(t) + H(t) - [H(t)]^2, \tag{2}$$

and $\int_0^t H(u)\,du$, where $P^{(n)}$ denotes the n-fold recursive Stieltjes convolution of P, are required. With the exception of the Poisson process, exact expressions do not usually exist and numerical evaluation is quite difficult [2] so, other than the partial tabulations of Soland [6] and White [7], numerical values are not readily available.

The Cléroux-McConalogue cubic spline algorithm [3], [4] partially resolves the numerical problems; this algorithm generates very accurate piecewise polynomial approximations to convolutions of the form $F^{(n)}(t)$ where $F \in C^2[0, \infty)$ is a distribution function whose density is bounded. McConalogue [5] (see also [1]) generalized this algorithm, permitting its application to a subclass of those distribution functions F for which F' exhibits a singularity at the origin.

The generalized algorithm was used to compute $H(t)$, $V(t)$ and $\int_0^t H(u)\,du$ for $t = 0(.05)20$ for the five probability distributions most commonly encountered in applications of renewal theory: the Weibull, gamma, lognormal, inverse Gaussian, and truncated normal distributions. Each of these was tabulated to 4 decimal places

(3 decimal places in the case of $\int_0^t H(u)\,du$) for a unit scale parameter and the following ranges of the shape parameters:

Gamma, Weibull	.55(.05)1(.25)7
Inverse Gaussian	.5(.05)1(.2)2(.5)9, 10, 12, 15, 20
Lognormal	.1, .2(.05).3(.1).7(.05).8, 1.0(.2)1.4(.1)1.6 (.2)2.4(.1)2.6(.2)3.4(.1)3.6(.2)4.0
Truncated normal	−2(.25)4.

The algorithm yields values of $F^{(n)}(t)$, and hence the variance and renewal functions were computed directly from (1) and (2); values of $\int_0^t H(u)\,du$ were obtained by integration of the spline representation.

AUTHOR'S SUMMARY

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1. L. A. BAXTER, "Some remarks on numerical convolution," *Comm. Statist. B—Simulation Comput.*, v. 10, 1981, pp. 281–288.

2. L. A. BAXTER, E. M. SCHEUER, D. J. MCCONALOGUE & W. R. BLISCHKE, "On the tabulation of the renewal function," *Technometrics*, v. 24, 1982, pp. 151–156.

3. R. CLÉROUX & D. J. MCCONALOGUE, "A numerical algorithm for recursively-defined convolution integrals involving distribution functions," *Management Sci.*, v. 22, 1976, pp. 1138–1146.

4. D. J. MCCONALOGUE, "Convolution integrals involving probability distribution functions (Algorithm 102)," *Comput. J.*, v. 21, 1978, pp. 270–272.

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6. R. M. SOLAND, "Availability of renewal functions for gamma and Weibull distributions with increasing hazard rate," *Oper. Res.*, v. 17, 1969, pp. 536–543.

7. J. S. WHITE, "Weibull renewal analysis," in *Proceedings of the Aerospace Reliability and Maintainability Conference, Washington, D. C., 29 June–1 July 1964*, Society of Automotive Engineers, New York, pp. 639–657.

29[65–06].—J. G. VERWER (Editor), *Colloquium Topics in Applied Numerical Analysis*, Vols. 1 and 2, CWI Syllabus 4 and 5, Centre for Mathematics and Computer Science, Amsterdam, 1984, vi + 483 pp., 24 cm. Price Dfl. 70.20.

In order to encourage interaction between researchers in academe and scientists in industry, and to draw attention to the widespread use of numerical techniques in most diverse application areas, the Department of Numerical Mathematics of the Centre for Mathematics and Computer Science in Amsterdam held a colloquium on "Topics in Applied Numerical Analysis" during the academic year 1983/84. The two volumes under review contain the 24 lectures presented during this colloquium. Most of them describe the use of existing, or improved, numerical methods in one particular application area. In line with the objectives of the colloquium, the applications are drawn from a wide variety of research activities in science and engineering. Two contributions also deal with vectorizing algorithms for use on a parallel computer.

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