assumed uniformly distributed in (0, 1) may not even be able to produce all the integers 1, 2, . . . , N, let alone to give them equal probabilities. Again, the random selection of r would need to be followed by the construction of the corresponding set member and it can be little more work to make several calls upon the random number generator and use the smaller integers produced from these calls to construct the set member. The difference equation approach is suitable for this step by step construction (e.g. for unrestricted permutations see Page, 1967). For the U'_n restricted n-permutations of Section 3 we note that a fraction $p_n = U'_{n-2}/(U'_{n-1} + U'_{n-2})$ begin with two equal digits; hence if $p_n < \xi$, where ξ is a standard uniform variate we start the n-permutation with the pair DD with probability $1/k$, and otherwise with the single digit D, again with probability $1/k$. We continue the construction, choosing whether a single digit or pair of equal ones follows with the correct probability, $U'_{r-2}/(U'_{r-1} + U'_{r-2})$ and then the actual digit with probability $1/k(k-1)$.

References

JOHNSON, S. M. (1963). Generation of permutations by adjacent transposition, *Math. Comp.*, Vol. 17, pp. 282-285.

LEHMER, D. H. (1964). *Applied combinatorial mathematics*, edited by E. F. Beckenbach, p. 20, Wiley: New York.

ORD-SMITH, R. J. (1970). Generation of permutation sequences: Part 1, *Comp. J.*, Vol. 13, pp. 152-155.

PAGE, E. S. (1967). A note on generating random permutations, *Applied Statistics. J. Roy. Statist. Soc. C*, 273-4 (see also *ibid* (1968), Vol. 17, p. 89).

PAIGE, L. J., and TOMPKINS, C. B. (1960). The size of the 10 × 10 orthogonal Latin square problem, Proceedings Symp. in Applied Maths., No. 10, *Combinatorial Analysis*, ch. 5, pp. 71-83.

WELLS, M. B. (1961). Generation of permutations by transposition, *Math. Comp.*, Vol. 15, pp. 192-195.

Book review

Elementary Linear Algebra, by Bernard Kolman, 1970; 255 pages. (*Collier-MacMillan Ltd.*, £4·50)

On commencing this book, it seems at first to be wholly admirable, giving a simple, logical and fairly rigorous introduction to finite-dimensional linear spaces, bases and linear transformations, having first introduced matrices and used the methods of elementary row reduction to echelon form of a matrix of a system of simultaneous linear equations to obtain the usual results on consistency and solutions. There is a first chapter on set theory and functions, though this language is not much used subsequently. Determinants are introduced and evaluation is given both by use of cofactors and alternatively by use of row-reduction methods. In the remainder of the book, use is made of eigenvectors to obtain similarity transformations of a matrix to diagonal form and these methods are then applied to symmetric matrices and quadratic forms and to obtaining orthogonal transformations in Euclidean space and, finally, to dealing with linear systems of ordinary differential equations with constant coefficients. The whole text is very adequately illustrated with a good selection of numerical examples.

However, this book seems to be a dangerous one to recommend for first reading by a student. It confines itself to finite dimensional vector spaces with real scalars but these restrictions are often not brought out explicitly enough. Thus we find the statement that a one-one linear transformation between two spaces of equal dimension is necessarily onto and, later, the surprising statement that the eigenvalues of a matrix are the *real* (my italics!) roots of its characteristic equation. A student could easily believe these to be true generally. This also leads to some illogical statements when a brief attempt is made to cover the use of complex scalars. Another fault is that, although there is some attempt to give numerical methods, those given are sometimes not very practical and there is no mention of iterative methods. For example, to obtain eigenvectors it is suggested that the characteristic equation should be solved by repeated bisection methods and these roots then used to obtain eigenvectors; the book limits this method to matrices of order less than 5! A final surprising omission in the last chapter is any consideration of normal modes.

There are few misprints in the book—I noted three affecting the mathematics, the omission of the word 'not' on line 8, p. 194 being perhaps the most important.

V. W. D. HALE (York)