55[8].—DOROTHY KERR, *Run Test for Randomness*, Applications Analysis Division, Department of Computer Services, Army Map Service, Washington, D. C. 20315, ms. in two volumes, 155 and 169 computer sheets, respectively (photographically reduced and unnumbered), deposited in the UMT file.

If u represents the number of runs in a random linear arrangement of two different kinds of objects (m of one kind, n of the other), then the probability that u does not exceed a given number u' can be found from the formula

$$P\{u \leqq u'\} = \sum_{u=2}^{u'} f_u \div \binom{m+n}{m}$$

where

$$f_u = 2\binom{m-1}{k-1}\binom{n-1}{k-1}, \qquad k = \frac{u}{2}, \text{ when } u \text{ is even };$$

and

$$f_u = \binom{m-1}{k-1}\binom{n-1}{k-2} + \binom{m-1}{k-2}\binom{n-1}{k-1},$$

$$k = \frac{u+1}{2}, \text{ when } u \text{ is odd [1]}.$$

The tables under review consist of 7D approximations to the value of P for $15 \leqq m \leqq n$, $m + n \leqq 100$. When $m = n$, the maximum theoretical value of u' is $2m$; when $m < n$, this maximum is $2m + 1$. However, the printed tabular values do not generally extend to these limits in u because of suppression as soon as they first equal unity when rounded to 7D. Likewise, all the entries equal to zero to 7D are omitted.

These tables constitute a direct continuation of a similar table by Swed & Eisenhart [2], to which reference is made in the brief introduction.

The underlying calculations were performed on a Honeywell 800 system, and several entries were checked against related data in a report of Argentiero & Tolson [3].

These new tables in conjunction with those in [2] should be particularly useful in connection with testing a large range of samples of data for randomness of grouping when the asymptotic formulas of Wald & Wolfowitz [4] do not yield the desired precision.

J. W. W.

1. WILLIAM FELLER, *An Introduction to Probability Theory and its Applications*, Vol. I, John Wiley & Sons, New York, 1950, pp. 56–58.

2. FRIEDA S. SWED & C. EISENHART, "Tables for testing randomness of grouping in a sequence of alternatives," *Ann. Math. Statist.*, v. 14, 1943, pp. 66–87.

3. P. D. ARGENTIERO & R. H. TOLSON, *Some Nonparametric Tests for Randomness in Sequences*, NASA Technical Note D-3766, December 1966.

4. A. WALD & J. WOLFOWITZ, "On a test whether two samples are from the same population." *Ann. Math. Statist.*, v. 11, 1940, pp. 147–162.

56[8].—FRANCIS J. WALL, *Tables of the Generalized Variance Ratio or U-Statistic*, ms. of 32 computer sheets deposited in the UMT file.

Univariate analysis of variance possesses a direct generalization for vector variables, leading to an analysis of vector sums of squares. A multivariate analogue of the variance σ^2 of a univariate distribution is the determinant of the covariance matrix Σ, called the "generalized variance" [1].

The generalized variance ratio or U-statistic, here tabulated, is the ratio of the likelihood estimate of the generalized residual variance assuming that the hypothesis is false to the likelihood estimate assuming that the hypothesis is true. The parameters for the U-statistic are the dimension p of the covariance matrix Σ and the degrees of freedom, q and n, for the hypothesis and error, respectively.

These unpublished tables, computed on an IBM 360 Model 40 system, consist of 6D values of $U(p, q, n)$ for $p = 1(1)8$, $q = 1(1)15(3)30(10)40(20)120$, $n = 1(1)30(10)40(20)140(30)200, 240, 320, 440, 600, 800$ 1000, at confidence levels $\alpha = 0.05$ and $\alpha = 0.01$, respectively.

As a partial check, recent 3D tables of Schatzoff [2] have been used by the author to recompute the U-statistic for $p = 4(2)10$, $q = 4$; $p = 5(7)9$, $q = 6$; $p = 3, 7$, $q = 8, 10$. These results were found to agree to at least 3D with the corresponding data in the more extended tables under review, which are the most elaborate of this type thus far calculated.

J. W. W.

1. T. W. ANDERSON, *An Introduction to Multivariate Statistical Analysis*, John Wiley & Sons, New York, 1958.
2. MARTIN SCHATZOFF, "Exact distributions of Wilks's likelihood ratio criterion," *Biometrika*, v. 53, 1966, pp. 347–358.

57[12].—J. M. FOSTER, *List Processing*, American Elsevier Publishing Co., Inc., New York, 1967, 54 pp., 23 cm. Price $4.50.

This is an excellent little book. It introduces the concepts of list-processing within a programming language which is an extension of ALGOL. This has the advantage that many of the techniques which are used in languages like LISP or IPL-V can be illustrated rather simply, and in a way which makes them easily accessible to the programmer who only knows ALGOL, or even FORTRAN. It has the slight disadvantage that the more innovative features of list-processing languages are lost, such as the lack of distinction between program and data in LISP, or the form of the replacement rule in SNOBOL.

The description of list-processing facilities is based mainly on LISP, both from the point-of-view of the user and of the implementer. Other established list-processing languages are also discussed.

The book reads very easily, but is by no means superficial, and would be very useful in an introductory course on programming or machine intelligence.

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58[12].—JAMES T. GOLDEN & RICHARD M. LEICHUS, *IBM 360 Programming and Computing*, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1967, ix + 342 pp., 26 cm. Price $5.50.

This recent entry to the steadily increasing ranks of IBM 360 programming texts