Raphson method was used, as in [2] and [3], and the computation required about 2 hours. The result is elegantly printed on 40 pages.

The decimal-digit frequency and a computed χ^2 is given for each block of 1000 digits. These 100 values of χ^2 were examined by the undersigned for their own distribution—theoretically, 10% should lie between 0 and 4.168, 10% between 4.168 and 5.380, etc. The actual distribution is

10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
11	14	11	7	8	14	7	5	8	15

which itself has a χ^2 of 11 with 9 degrees of freedom. This is a thoroughly satisfactory test for randomness.

The authors also counted runs of like digits. These counts were made with the convention of disregarding the digits immediately before and after the counted run; thus, the eight digits 32412–32419D are 54444442 and are counted as one sextuple, two quintuples, three quadruples, and four triples. There are 1023 triplets, 105 quadruples, 11 quintuples, and two sextuples. These run counts, therefore, also satisfactorily agree with the predictions based upon an hypothesis of randomness. Compare the earlier suggestions that the $\sqrt{2}$ may not be normal that are mentioned in the review of [1].

D. S.

1. *Math. Comp.*, v. 21, 1967, pp. 258–259, UMT 17.
2. *Math. Comp.*, v. 22, 1968, p. 226, UMT 12.
3. *Math. Comp.*, v. 22, 1968, p. 234, UMT 22.

87[7, 10].—Peter H. Roosen-Runge, *A Table of Bell Polynomials*: Y_1 *to* Y_{16}, Communication 212, Mental Health Research Institute, The University of Michigan, Ann Arbor, Michigan, August 1967, 23 pp., 28 cm.

The polynomials tabulated in this report were first studied by Bell [1] as a generalization of his exponential numbers [2]. They are presented here in the form

$$Y_n = \sum_{k=1}^{n} f_k A_{n,k}(g_1, \cdots, g_n) .$$

In his introductory text the author identifies Y_n with the nth derivative of a composite function $Y = f(g)$, where subscripts are used to designate the orders of the respective derivatives of f and g.

The computation of the present table was performed on an IBM 7090 system, using recurrence relations incorporated in a program written in SNOBOL. This program is appended to the explanatory text.

The author also shows the connection between the Bell polynomials and certain combinatorial problems, as revealed by the formula of Faà di Bruno [3].

Three applications of these polynomials to the evaluation of the coefficients of exponential generating functions are described; two of these are attributed to Riordan [3].

The first eight and ten polynomials, respectively, were checked against the corresponding tables in Riordan [3, p. 49] and the NBS *Handbook* [4]. The author found that a table of the first 11 polynomials by Hsieh & Zopf [5] has several errors in the entries for Y_{10} and Y_{11}. In spite of the precautions taken to insure complete accuracy of the present table, the reviewer has detected a typographical error: In Y_9 the coefficient of the second term in $A_{9,3}$ should read 1260 instead of 126. Four additional typographical errors, subsequently discovered by the author, have also been corrected in the copy of this table deposited in the UMT file.

This useful and attractively printed table represents one of the more interesting applications of electronic computers to tablemaking.

J. W. W.

1. E. T. BELL, "Exponential polynomials," *Ann. of Math.*, v. 35, 1934, pp. 258–277.
2. E. T. BELL, "Exponential numbers," *Amer. Math. Monthly*, v. 41, 1934, pp. 411–419.
3. J. RIORDAN, *An Introduction to Combinatorial Analysis*, John Wiley & Sons, New York, 1958.
4. M. ABRAMOWITZ & I. A. STEGUN, Editors, *Handbook of Mathematical Functions with Formulas, Graphs, and Mathematical Tables*, National Bureau of Standards, Applied Mathematics Series No. 55, U. S. Government Printing Office, Washington, D. C., 1964, Table 24.2, pp. 831–832.
5. H. S. HSIEH & G. W. ZOPF, *Determination of Equivalence Classes by Orthogonal Properties*, Technical Report No. 2, Project No. 60(8–7232), Electrical Engineering Research Laboratory, University of Illinois, 1962.

88[8].—ROY C. MILTON, *Rank Order Probabilities: Two-Sample Normal Shift Alternatives*, University of Minnesota, Department of Statistics, Technical Report No. 53, Minneapolis, Minnesota, 1965.

Let $X_1, \cdots, X_m$ and $Y_1, \cdots, Y_n$ be samples drawn from two different populations. Nonparametric tests for equality of the two populations are based on the rank order statistic $\mathbf{Z} = (Z_1, \cdots, Z_N)$, $N = n + m$, where Z_j is 1 or 0 according as the jth smallest observation is a Y or an X.

The distribution of $\mathbf{Z}$ under the null hypothesis is well known: $\mathbf{Z}$ takes on each of its possible values with probability $m!n!/N!$. Milton's tables give the distribution of $\mathbf{Z}$ under the alternative hypothesis that $X_1, \cdots, X_m, Y_1, \cdots, Y_n$ are Gaussian with variances all equal to σ^2 and means μ_1 for the X's and μ_2 for the Y's. The distribution of $\mathbf{Z}$ depends only on m, n and $\Delta = (\mu_2 - \mu_1)/\sigma$. In fact if $\mathbf{z} = (z_1, \cdots, z_N)$ is a vector of m zeros and n ones in some order then the probability that $\mathbf{Z}$ takes on the value $\mathbf{z}$ is

$$P_{m,n}(\mathbf{z}|\Delta) = m!n! \int \cdot \cdot \cdot \int_{-\infty < t_1 < \cdots < t_N < \infty} \prod_{j=1}^{N} \phi(t_j - \Delta z_j) dt_j ,$$

where $\phi(t) = (2\pi)^{-1/2} \exp(-t^2/2)$ is the standard Gaussian density function. Milton tabulates $P_{m,n}(\mathbf{z}|\Delta)$ for all choices of $\mathbf{z}$ and for $1 \leqq m \leqq 7$, $1 \leqq n \leqq 7$, $\Delta = .2(.2)1.0,1.5,2.0,3.0$.

The tables also contain values of the Wilcoxon statistic, the Fisher-Yates c_1 and c_2 statistics. The sections are arranged according to increasing values of $m + n$. The values of $P_{m,n}(\mathbf{z}|\Delta)$ for a given small value of $m + n$ appear on one double spread page; values for large $m + n$ are listed on successive pages; the columns are indexed by values of $\mathbf{z}$ and are arranged in decreasing order of the c_1 statistic with ties broken by the c_2 statistic.

Various applications of the table are discussed in the introduction; the most obvious application is to the computation of power functions of nonparametric