119[H].—T. A. Ciriani & A. L. Frisiani, *Tabulation of Solutions of the Cubic Equation* $z^3 + Az - A = 0$, IBM Italia and Instituto di Elettrotecnica Università di Genova, Genova, Italy, undated ms. of 10 typewritten pp. + a block diagram + 32 pp. of tables, deposited in UMT File.

The equation (1) $x^3 + ax^2 + bx + c = 0$, under the transformation $y = x + (a/3)$, becomes (2) $y^3 + py + q = 0$, where $p = (3b - a^2)/3$ and $q = (2a^3 - 9ab + 27c)/27$. Setting $z = -py/q$, (2) becomes (3) $z^3 + Az - A = 0$, where $A = p^3/q^2$. If z_1 is a root of (3), the other two roots are given by

$$z_{2,3} = -\frac{z_1}{2} \pm \sqrt{\left(-A - \frac{3z_1^2}{4}\right)}. \tag{4}$$

For $A \leqq -6.75$, equation (3) has three real roots; for $A > -6.75$, it has one real and two complex conjugate roots.

The tables give all three roots for $\pm A = 0.0001(0.0001)0.01(0.001)0.1(0.005)$-$0.5(0.01)1(0.05)10(0.1)20(1)100(5)500$, to 8S. No aids to interpolation are tabulated. In the text it is stated that extensive checks were performed (not described) and that the roots were found accurate to 8S except in the neighborhood of $A = -6.75$ (accuracy there not specified).

The computations were performed on an IBM 1401, using 12S. First a real root z_1 was computed by a method of successive approximations which about halved the error at each step. For $A < -6.75$, the other two real roots were obtained from (4). For $A > -6.75$, a first approximation to the complex pair, $C_0 \pm jD_0$, was obtained from (4) and successively improved, using J. A. Ward's downhill method [1], which appears to about halve the error at each stage.

For A outside the range of the table, namely for $A < -500$, $|A| < 0.0001$ and $A > 500$, first approximations to z_i, $i = 1, 2, 3$, are given in terms of A, with bounds for the relative error that range from $1.6 \cdot 10^{-2}$ down to $7 \cdot 10^{-4}$, together with a function γ, expressed in terms of A, such that a better approximation may be obtained by multiplying the first approximation by $1 + \gamma$.

On p. 8 the statement is made that the only previous tabulation of this form known to the authors extends over a smaller range and gives only the value of a real root. Apparently the authors are unaware of the fact that in H. E. Salzer, C. H. Richards & I. Arsham, *Table for the Solution of Cubic Equations*, McGraw-Hill, New York, 1958, there are similar tables for obtaining all three roots, as functions of an argument $\theta = 1/A$ corresponding to the complete range of A.

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1. J. A. Ward, "The down-hill method of solving $f(z) = 0$," *J. Assoc. Comput. Mach.*, v. 4, 1957, pp. 148–150.

120[I].—D. S. Mitrinović & R. S. Mitrinović, *Tableaux d'une classe de nombres reliés aux nombres de Stirling*, (a) IV: Belgrade, Mat. Inst., *Posebna izdanja*, Knjiga 4 (*Editions spéciales*, 4), 1964, 115 pp., 24 cm., (b) V: *Publ. Fac. Elect. Univ. Belgrade* (*Série: Math. et Phys.*), No. 132, 1965, 22 pp., 24 cm.

The first three installments of these tables were reviewed in *Math. Comp.*, v. 17, 1963, p. 311 and v. 19, 1965, pp. 151–152 (in the latter review, *for* ${}^pP_n{}^+$, *read* ${}^pP_n{}^r$ in two places, *for* x^+, *read* x^r, and *for* Instituto, *read* Istituto).