72[I].—HERBERT E. SALZER & GENEVIEVE M. KIMBRO, *Tables for Bivariate Osculatory Interpolation Over a Cartesian Grid*, Convair-Astronautics, Convair Division of General Dynamics Corporation, San Diego, California, 1958, 40 p.

Formulas are developed for binary polynomials $P(x, y)$ which agree together with the partial derivatives $P_x(x, y)$ and $P_y(x, y)$, with $f \equiv f(x, y)$, $f_x \equiv f_x(x, y)$ and $f_y \equiv f_y(x, y)$ at n specified points. They have the advantage over ordinary bivariate interpolation of packing $3n$ conditions into n points. Unlike univariate polynomial osculatory interpolation which always possesses a solution for any irregular configuration of fixed points, a binary polynomial of prescribed form may not satisfy those $3n$ conditions for *any* choice of interpolation points, or may fail for just certain *special* configurations. Explicit formulas or methods are developed for the general 2- to 5-point cases. For interpolation over any square Cartesian grid of length h, for suitable 2- to 5-point configurations of (x_i, y_i), according to the formula

$$f(x, y) \equiv f(x_0 + ph, y_0 + qh) \sim P(x_0 + ph, y_0 + qh)$$

$$\text{(I)} \qquad = \sum_{i=0}^{n-1} \{A_i^{(n)}(p, q)f_i + h[B_i^{(n)}(p, q)f_{x_i} + C_i^{(n)}(p, q)f_{y_i}]\},$$

tables of exact values of $A_i^{(n)}(p, q)$, $B_i^{(n)}(p, q)$ and $C_i^{(n)}(p, q)$ are given for p and q each ranging from 0 to 1 at intervals of 0.1. A closed expression for the remainder in (I) has not been found. In its place, formulas are derived for the leading terms in the bivariate Taylor expansions for the remainders. These formulas should cut down the number of needed strips in the numerical solution of Cauchy's problem for first order partial differential equations by the method of characteristic strips.

AUTHOR'S ABSTRACT

73[K].—D. E. BARTON & F. N. DAVID, "A test for birth order effect," *Ann. Human Genetics*, v. 22, 1958, p. 250–257.

In an ordered sequence of trials it is known that there were r_1 occurrences and r_2 non-occurrences of a particular event. The question at issue has to do with the randomness of the positions of the occurrences in the sequence vs. a tendency to appear either at the ends or in the middle of the sequence. A test criterion is obtained by dividing the sequence between the Rth and the $(R + 1)$st event, where $r_1 + r_2 = 2R$ or $2R + 1$, and then assigning ranks 1, 2, $\cdots$ to the events by order of position beginning at the point of division and proceeding to the left and then again starting with 1 to the right. The sum of the ranks of occurrences as assigned is the test criterion S. For $r_1 + r_2 = 4(1)16$ with $r_1 \geqq r_2$, on the null hypothesis of random position of occurrences, the exact distribution of S is tabulated for each pair (r_1, r_2) for $r_2 \geqq 2$. For $r_1 + r_2 > 16$, it is stated that the distribution of S is sufficiently closely approximated by a normal distribution.

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