where p is the proportion of the complete population which is eliminated by truncation. In this chart, a extends from -3.0 to 0.5, b extends from -0.5 to $+3$, $p = .05$, .10(.10)1.0, $\mu_{ab} = -1.0(.1)1.0$, $\sigma_{ab} = 0(.1).9$. A second chart contains a set of five curves for selected values of n and r to be used in determining a and p as a function of h, where $h = (\mu - \text{LAL})/\sigma$. Values of a extend from -1.4 to 0.4, h extends from -1.0 to 0.4, and p from .10 to .65.

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47[K].—W. H. CLATWORTHY, *Contributions on Partially Balanced Incomplete Block Designs with Two Associate Classes*, NBS Applied Mathematics Series, No. 47, U. S. Government Printing Office, Washington 25, D. C., 1956, iv + 70 p., 26 cm. Price $.45.

This publication contains six papers dealing with various aspects (enumeration, dualization, and tabulation) of partially balanced incomplete block designs with two associate classes, and with the construction of some new group divisible designs, triangular incomplete block designs, and Latin square type designs with two constraints. Approximately 75 new designs not contained in the monograph of Bose, Clatworthy, and Shrikhande [1] are given in the present paper. A number of theorems are proved in the six papers. Two of the theorems give bounds on the parameters v, p_{11}^1, and p_{12}^1 in terms of the parameters r, k, n_1, n_2, λ_1, and λ_2 of the partially balanced incomplete block design with two associate classes. The two theorems on the duals of partially balanced designs are useful in identifying certain partially balanced incomplete block designs.

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1. R. C. BOSE, W. H. CLATWORTHY & S. S. SHRIKHANDE, *Tables of Partially Balanced Designs with Two Associate Classes*, North Carolina Agricultural Experiment Station Technical Bulletin No. 107, 1954.

48[K].—W. J. DIXON, "Estimates of the mean and standard deviation of a normal population," *Ann. Math. Stat.*, v. 28, 1957, p. 806–809.

Four estimates of the mean in samples of N from a normal population are compared as to variance and efficiency. These are (a) median, (b) mid-range, (c) mean of the best two, (d) $\bar{X}_{)1,N(} = \sum_{i+2}^{N-1} [X_i/(N - 2)]$. The sample values are denoted $X_1 \leqq X_2 \leqq \cdots \leqq X_N$. The results for the median and mid-range are given primarily for comparison purposes, since results are well known. The mean of the best two is reported as the small sample equivalent of the mean of the 27th and 73rd percentiles.

The variance and efficiency are given to $3S$ for $N = 2(1)20$. The estimate (d) is compared to the best linear systematic statistics (BLSS) as developed in [1] and [2]. It is noted that the ratio Var (BLSS)/Var $(\bar{X}_{)1,N(})$ is never less than 0.990.

Two estimates of the standard deviation are given in Table II. One, the range, is well known. The quantity k which satisfies $E(kW) = \sigma$ is tabulated to $3D$ for $N = 2(1)20$. Denote the subranges $X_{N-i+1} - X_i$ by $W_{(i)}$ and $W_{(1)} = W$. The estimate $S' = k'(\sum W_{(i)})$, where the summation is over the subset of all $W_{(i)}$ which gives