

4.22 Tables for Testing Simultaneous Homogeneity against Ordered Alternatives in 3-Way Layout and Latin Square Design

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ABSTRACT

The likelihood ratio test for testing simultaneous homogeneity of main effects of several factors against ordered alternatives in multifactor designs has been developed in the literature. But the level probabilities needed to implement these tests have been computed only for the 2-way layout. We use these results to calculate critical points for testing simultaneous homogeneity of main effects against simple order alternatives in 3-way layout and Latin square design.

Tabulation of critical values requires finding values of c that satisfy

$$\Pr(\bar{E}^2(m, n, t) \geq c) = \sum_{l=4}^{m+n+t} Q(l; m, n, t) \Pr(B_{\frac{1}{2}(l-3), \frac{1}{2}(mnt-l+2)} \geq c), \text{ for 3-way layout}$$

and

$$\Pr(\bar{E}^2(m, m, m) \geq c) = \sum_{l=4}^{3m} Q(l; m, m, m) \Pr(B_{\frac{1}{2}(l-3), \frac{1}{2}(m^2-l+2)} \geq c), \text{ for Latin Square}$$

Design, where \bar{E}^2 is the corresponding likelihood ratio test statistic, $Q(l; m, n, t)$ are convolution of probabilities used in order restricted inference and $B_{a,b}$ is the Beta distribution with parameters a, b .

The tables presented here provide critical values for testing at significance level α for the combinations of m, n, t and α , where $m, n, t = 2(1)10$, $\alpha = 0.1, 0.05, 0.025, 0.01, 0.005$.

An application in the case of Latin Square Design and FORTRAN programs for the computation of critical values in several layouts are also presented.

Some key words: *Isotonic regression; Likelihood ratio test; Multifactor layouts; Latin Square Design; Simple order alternatives;*