ABSTRACTS OF PAPERS

(Abstracts of papers presented at the Central Regional Meeting, Manhattan, Kansas, May 7–9, 1964.)

1. Tables for the Studentized Largest Chi-Square Distribution and Their Applications.

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Let $\chi_1^2, \cdots, \chi_K^2$ be independently distributed chi-squares each with n degrees of freedom and let χ_0^2 be another chi-square with m degrees of freedom distributed independently of the other K chi-squares. Then the distribution of $S = m\chi_{\max}^2/n\chi_0^2$, where $\chi_{\max}^2 = \max\ (\chi_1^2, \cdots, \chi_K^2)$, is known to be the Studentized largest chi-square distribution. S. S. Gupta (*Ann. Inst. Statist. Math.* **14** 199–216) gave the reciprocals of the upper 25%, 10%, 5% and 1% points for the distribution of S when $K = 1(1)10$ and $m = n = 2(2)50$. In the present paper, upper 10%, 5% and 1% points are given for $K = 2(1)12$, $n = 1(1)20$ and $m = 5(1)50$. Various applications of these tables are also discussed.

2. On Testing the Equality of Parameters to a Specified Value in One or More Rectangular Distributions.

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Let $X_1, \cdots, X_k$ be $k \geqq 1$ stochastically independent random variables, where each X_i, $i = 1, \cdots, k$, is distributed uniformly on the interval from 0 to θ_i, and let the hypothesis to be tested be $\{H_0: \theta_1 = \cdots = \theta_k = \theta_0\ ; H_1: \theta_i \neq \theta_0$ for at least one $i\}$, where θ_0 is some specified value. The distribution of $-2 \ln \Lambda$ (where Λ is the likelihood ratio test statistic) when the hypothesis is true has previously been found by Hogg (*Ann. Math. Statist.* **27** (1956) 529–532). If the sets A and B are defined by $\{\theta_\alpha : \alpha \varepsilon A\} = \{\theta_\alpha : \theta_\alpha \leqq \theta_0\}$ and $\{\theta_\beta : \beta \varepsilon B\} = \{\theta_\beta : \theta_0 < \theta_\beta\}$, then the power function of the likelihood ratio test is equal to one in case $\prod_{\alpha \varepsilon A} \theta_\alpha^{n_\alpha} \leqq \lambda_0 \theta_0^{\Sigma}$, where $\Sigma = \sum_{\alpha \varepsilon A} n_\alpha$, and is equal to $1 - \prod_{\beta \varepsilon B} (\theta_0/\theta_\beta)^{n_\beta} + \lambda_0 \prod_{i=1}^{k} (\theta_0/\theta_i)^{n_i} \sum_{\gamma=0}^{k-1} [(-1)^\gamma/\gamma!] \ln^\gamma [\lambda_0 \prod_{\alpha \varepsilon A} (\theta_0/\theta_\alpha)^{n_\alpha}]$ in case $\lambda_0 \theta_0^{\Sigma} \leqq \prod_{\alpha \varepsilon A} \theta_\alpha^{n_\alpha}$, where $\{\lambda : 0 \leqq \lambda \leqq \lambda_0\}$ is the critical region of the test. In particular, the power function is continuous and the test is unbiased; and if the significance level of the test is α, then $\alpha = \lambda_0 \sum_{\gamma=0}^{k-1} [(-1)^\gamma/\gamma!] \ln^\gamma (\lambda_0)$.

3. On Testing the Equality of Parameters of Two Rectangular Distributions.

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The class of tests of the hypothesis of equality (common value unspecified) of two distributions uniform of the interval from 0 to θ_i, $i = 1, 2$, in which the power function is continuous and the critical region is of the form $\{(w_1, w_2): w_2 \leqq g_*(w_1)$ or $g^*(w_1) \leqq w_2\}$, where w_i, $i = 1, 2$, is the largest item of a random sample of size n_i from the ith distribution, g^* and g^* have inverse functions such that g^* and g^* are continuous and $g^*(t) \leqq t \leqq g^*(t)$ for all $t > 0$, is considered; Murty's test (*J. Amer. Statist. Assoc.* **50** (1955) 1136–1141) and the likelihood ratio test are members of this class. It is proved that the unique unbiased member of this class is the likelihood ratio test. It is shown that if sample sizes are equal, then $-2 \ln \Lambda$, where Λ is the likelihood ratio test statistics, is distributed as the absolute value of a random variable which has a Laplace distribution with certain parameters. The power function of the likelihood ratio test is found; it possesses the monotonicity property.