

## ABSTRACTS OF PAPERS

*Abstracts of papers presented at the Western Regional meeting, Los Angeles, California, August 15-17, 1966. Additional abstracts appeared in the June issue and will appear in future issues.*

### **5. Estimation in mixtures of two normal distributions.** A. CLIFFORD COHEN, University of Georgia.

This paper is concerned primarily with the method of moments in dissecting a mixture of two normal distributions. In the general case, with two means, two standard deviations, and a proportionality factor to be estimated, the first five sample moments are required, and it becomes necessary to find a particular solution of a ninth degree polynomial equation that was originally derived by Karl Pearson (1894). A procedure which circumvents solution of the nonic equation and thereby considerably reduces the total computational effort otherwise required, is presented. Estimates obtained in the simpler special case in which the two standard deviations are assumed to be equal, are employed as first approximations in an iterative method for simultaneously solving the basic system of moment equations applicable in the more general case in which the two standard deviations are unequal. Conditional maximum likelihood and conditional minimum chi-square estimation subject to having the first four sample moments equated to corresponding population moments, are also considered. An illustrative example is included. (Received 2 June 1966.)

### **6. Some percentile estimators for Weibull parameters.** SATYA D. DUBEY, Ford Motor Company.

A percentile estimator for the shape parameter of the Weibull distribution, based on the 17th and 97th sample percentiles, is proposed which is asymptotically about 66% efficient when compared with the MLE (maximum likelihood estimator) and is superior to an estimator proposed by Menon (*Technometrics* 5 175-182) which uses all  $n$  observations of the sample. A two-observation percentile estimator, based on the 40th and 82nd sample percentiles, for the scale parameter when the shape parameter is unknown is asymptotically about 82% efficient when compared with the MLE. The 24th and 93rd sample percentiles yield asymptotically about 41% jointly efficient percentile estimators for both the scale and shape parameters in a class of two-observation percentile estimators when compared with their MLE's. Some other simple percentile estimators for these parameters are also briefly discussed. Finally, asymptotic properties of these estimators are investigated and their application in statistical inference problems is mentioned. (Received 30 May 1966.)

### **7. Maximum-likelihood estimation, from doubly censored samples, of the parameters of the first asymptotic distribution of extreme values.** H. LEON HARTER and ALBERT H. MOORE, Aerospace Research Laboratories, Wright-Patterson AFB, and Air Force Institute of Technology, Wright-Patterson AFB.

Let  $X$  be a random variable having the first asymptotic distribution of smallest (largest) values, with location parameter  $u$  and scale parameter  $b$ ,  $b > 0$ . The natural logarithm of the likelihood function of a sample of size  $n$  from such a distribution, the lowest  $r_1$  and the highest  $r_2$  sample values having been censored, is written down and its first and second partial derivatives with respect to the parameters are worked out. The likelihood equations,