ABSTRACTS OF PAPERS

(Abstracts of papers not connected with any meeting of the Institute.)

1. The number of linearly inducible orderings of points in Euclidean n-space. THOMAS M. COVER, Stanford University.

A collection of k points in E^n is ordered by orthogonal projection onto a freely chosen reference vector $w \varepsilon E^n$. If σ is a permutation of the integers $\{1, 2, \cdots, k\}$, $w \varepsilon E^d$ induces the ordering σ if $w \cdot x_{\sigma(1)} > w \cdot x_{\sigma(2)} > \cdots > w \cdot x_{\sigma(k)}$; and σ is said to be linearly inducible if there exists such a w. In this paper it is demonstrated that there are precisely $Q(k, n)$ linearly inducible orderings of k points in general position in E^n, where $Q(k, n) = 2\sum_{j=0}^{n-1} {}_kS_j$ and ${}_kS_j$ is the sum of products of numbers taken j at a time without repetition from the set $\{2, 3, \cdots, k-1\}$. Thus $Q(k, n)$ is the number of ways an art judge may rank k paintings, each having n numerical attributes, by forming weighted averages of the attributes. (Received 20 June 1966.)

2. Statistical inference. V. P. GODAMBE, Johns Hopkins University.

Fisherian statistics and for that reason most of the current mathematical statistics deals with *hypothetical* populations having no real existance at all. This hypothetical character of the populations has been emphasized above all by Fisher himself, on several occasions. On the other hand statisticans often have to deal with *real* populations, i.e. the populations consisting of a large number of *identified* individuals each having some variate value. Clearly, only for such real populations can one use just a random number table to draw a random sample. Sample-survey populations serve a good illustration. The first indication, that for such real populations of identified individuals, the results of current mathematical statistics are inadequate, was provided by the author's [*J. Roy. Statist. Soc.* (1955)] demonstration of the non-existance of the UMV estimation for such populations, *regardless* of the distribution of the variate values. This point was further emphasized by the author subsequently [*Sankhyā* (1960), *Rev. Inter. Statist. Inst.* (1965), *Ann. Math. Statist.* (1965), *J. Roy. Statist. Soc.* (1966)] several times. Now it is shown that the very basic concepts of mathematical statistics such as "significance level" or "power", need complete revision before they can be applied to real populations of identified individuals. For instance a test is constructed for the mean of a population, which has neither "significance level" or "power" and yet looks reasonable enough in terms of some prior knowledge. In other words just the frequency function of the variate in a real population of identified individuals does *not* determine the test criteria for the unknown parameter of the frequency function. (Received 13 June 1966.)

3. Bayesian sufficiency in survey-sampling. V. P. GODAMBE, Johns Hopkins University.

The main constituents of Bayesian inference, in order of their importance are as follows: (1) Bayes theorem of inverse probability. (2) A specific prior distribution on the parameter space. (3) A loss function. Now for several problems of inference loss function does not at all exist or is only very vaguely defined. Next often the prior knowledge about the parameter in (2) can at best be characterized by a *class* of prior distributions and not by any specific prior distribution. Hence the following relaxation of (2) and (3) above is suggested: Principle of Baysian Sufficiency. "*If* Ω is the class of prior distributions of the parameter char-