II THE NEYMAN-PEARSON THEORY OF TESTING A STATISTICAL HYPOTHESIS [4)]

The principles of statistical inference as developed in the last two decades by R.A.Fisher, Neyman and Pearson deal with the problem of testing a hypothesis and with the problem of estimation but not with the general problem of statistical inference as it has been formulated in the foregoing pages. A further restriction in these theories is that they deal only with the case that Ω is a k-parameter family of distribution functions, i.e., that the true but unknown distribution function F is known to be an element of a k-parameter family of functions

$$F(x_1, x_2, \ldots, x_n, \theta_1, \theta_2, \ldots, \theta_k)$$

where $\theta_1, \ldots, \theta_k$ are parameters. In this case the specification of the values of the parameters specifies completely the distribution function F.

A set of parameter values can be represented by a point in a k-dimensional Euclidean space called a parameter space. Because of the one-to-one correspondence between elements of Ω and points of the parameter space we can identify Ω with the parameter space. If for example, $X_1, \ldots, X_n$ are normally and independently distributed, each having the same distribution (equation(2)), then the parameter space is a half plane where $\theta_1 = \mu$ = mean value, and $0 \leq \theta_2 = \sigma$ = standard deviation.

A hypothesis concerning F is expressed by the statement that the true parameter point lies in a certain subset ω of the parameter space Ω. As we have done before, we shall call the hypothesis a simple one if ω consists of a single point.

4) See, in this connection, references 12,13 and 14