MULTI-STAGE TESTS OF HYPOTHESES*

Gary Lorden

California Institute of Technology

A method is given for constructing multi-stage tests that have prescribed error probabilities. The characteristics of the method and its computational requirements are discussed. Numerical examples are given for the case of testing the arrival rate of a Poisson process.

1. Introduction.

Problems of constructing efficient multi-stage tests of hypotheses were studied in Lorden (1983), where it was shown that certain three-stage tests modeled after fully sequential tests are in a typical Koopman-Darmois testing problem asymptotically optimal in comparison with sequential tests. (Two-stage tests are not asymptotically optimal except in degenerate cases.) A major drawback of the tests in that paper is the lack of a good approximation to their error probabilities. The multi-stage tests of the current investigation (whose asymptotic optimality will be established in a later paper) have the advantage of attaining prescribed error probabilities. The price of this feature is additional computational work required to carry out the tests, the amount of work depending on the type of testing problem and the distributions involved.

The multi-stage tests in Lorden (1983) were constructed to emulate the sequential likelihood ratio tests of G. Schwarz (1962), whereas the present approach is, fittingly, modeled after the mixed likelihood ratio tests of

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