

ABSTRACT

On Uniformly Most Powerful Monotone Tests And Their Competitors For Hypotheses Concerning The Minimum Of Several Location Parameters.

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The likelihood ratio test, T , of the null hypothesis that the minimum of several location parameters is not greater than zero is to reject when the minimum of the estimates is greater than some constant c . This is a uniformly most powerful monotone test; i.e. any set of estimates which are greater than a set which is in the rejection region, would also reject. A real example arises in the comparison of the average responses of k ($k \geq 2$) patient subjects to two different treatments, where the responses are assumed to be normal means.

This monotone test, T , which is also uniformly most powerful, has been improved on by Gutmann(1987), Berger(1989) and Shirley(1992). The object of this work is to compare improved tests which are uniformly more powerful

than T , by analysing their critical regions, power functions and bias. Recent work done by Liu(1992) and Li and Sinha is also discussed.

This thesis shows that for test sizes greater than 0 and less than 0.25 and $k = 2$, Berger's(1989) test is uniformly more powerful than the LRT and tests constructed by Gutmann(1987) for the testing of hypotheses involving normal means. We further show that Shirley's(1992) test is more powerful than Berger's for $k = 3$ and test size 0.05 at several parameter points.

The tests constructed by Gutmann(1987) and Shirley(1992) produced confidence sets for the minimum of several location parameters which have a sharper lower confidence bound than that produced by the LRT. Consequently, we have attempted to improve on the estimator of the larger two translation parameters. We have proposed a simple estimator which does not dominate the well known estimator of $\max(x_1, x_2)$, however, it has a smaller mean square error than $\max(x_1, x_2)$ when the absolute difference between the parameters is greater than or equal to 2.72.