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ADVANCED ECONOMETRIC THEORY
EXERCISES 7

UNBIASED AND INVARIANT TESTS

Reference: Gouriéroux and Monfort (1995, Chapter 15)

1. Define the following notions:
   (a) unbiased test;
   (b) α-similar test;
   (c) test with Neyman α-structure.
2. Prove that a uniformly most powerful test with level α is necessarily unbiased.
3. Let $(\Upsilon, (P_\theta : \theta \in \Theta))$ be a parametric model. If $\varphi(y)$ is a test of the hypothesis $H_0 : \theta \in \Theta_0$, where $\Theta_0 \subseteq \Theta$, and if $E_\theta \varphi(y)$ is a continuous function of θ, show the following property: if φ is an unbiased test with level α, the test φ is α-similar on the frontier of Θ_0.
4. Explain how invariant tests can reduce the number of nuisance parameters in a test problem.

References

GOURIÉROUX, C., AND A. MONFORT (1995): *Statistics and Econometric Models, Volumes One and Two*. Cambridge University Press, Cambridge, U.K., Translated by Quang Vuong.