Detection and Estimation Theory

University of Tehran

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Homework 8

Due : 99/3/17

Problem 1

Suppose $X_1, X_2, ..., X_n$ are i.i.d observations of a random variable X with the uniform density in the interval $(0, \theta)$, where $\theta > 0$ is an unknown parameter.

a) Show that the statistic $X_{(n)} = \max\{X_1, X_2, ..., X_n\}$ is a minimal sufficient statistic for θ.

b) Is $X_{(n)} = \max\{X_1, X_2, ..., X_n\}$ a complete sufficient statistic?

c) Derive the MVUE estimation for θ.

d) Derive the ML estimation for θ and compute its bias and variance.

Problem 2

Suppose $X_1, X_2, ..., X_n$ are i.i.d observations of a random variable X with the uniform density in the interval $(\theta, \theta + 1)$ where θ is an unknown parameter.

a. Obtain a minimal sufficient statistic for θ.

b. Is the sufficient statistic in part a complete?

c. Derive the ML estimation for θ and compute its bias and variance.
