Tutorial of ST5215

AY2020/2021 Semester 1

17 Sep 2020

Exercise 1. Let $X_1, \ldots, X_n$ be i.i.d. random variables having the exponential distribution $E(0, \theta), \theta \in (0, \infty)$. Consider estimating θ under the squared error loss.
Calculate the risks of the sample mean $\bar{X}$ and $cX_{(1)}$, where c is a positive constant.
Is $\bar{X}$ better than $cX_{(1)}$ for some c?

Exercise 2. Consider the estimation of an unknown parameter $\theta \geq 0$ under the squared error loss. Show that if T and U are two estimators such that $T \leq U$ and $R_T(P) < R_U(P)$, then $R_{T_+}(P) < R_{U_+}(P)$, where f_+ denotes the positive part of f.

Exercise 3. Let X be a random variable having the binomial distribution $\mathrm{Bi}(p, n)$ with an unknown $p \in (0, 1)$ and a known n. Consider the problem of estimating $\theta = p^{-1}$. Show that there is no unbiased estimator of θ.