Homework 4, ST5215

AY2020/2021 Semester 1

Due: 10 Nov 2020

Instruction

- Only PDF format and one PDF file will be accepted
- Name your PDF file in the format: StudentID.pdf, where "StudentID" is replaced with your ID number
- Go to LumiNus system and upload your PDF file to the folder *Submissions/HW4*. Before the deadline, you can update your previous submission by first deleting the old submission and then submitting the updated version.
- There are 4 questions in this assignment.

Problem set

JS = Mathematical Statistics, 2nd Ed, Jun Shao, 2003

Problem 1. Let $X_1, \ldots, X_n$ be i.i.d. from $\mathrm{E}(0, \theta)$, where $\theta > 0$ is unknown. Let $\hat{p}_n = \#\{i \leq n : X_i \geq 1\}/n$ and $\bar{X}_n = (X_1 + \cdots + X_n)/n$. Determine the asymptotic relative efficiency of $-\log \hat{p}_n$ with respect to $1/\bar{X}_n$ for estimating $1/\theta$.

Problem 2. Let $X_1, \ldots, X_n$ be i.i.d. from $\mathrm{N}(\mu, 1)$, where $\mu > 0$ is unknown. Consider estimating μ by $\bar{X}_n = (X_1 + \cdots + X_n)/n$ and the sample median $m_n = X_{(\lfloor n/2 \rfloor)}$. Determine the asymptotic relative efficiency of $\bar{X}_n$ w.r.t. m_n.

Problem 3. Exercise 2.6.118 in JS

Problem 4. Exercise 4.6.112 in JS