Assignment 3

PM522b Introduction to the Theory of Statistics Part 2

Due: February 6, 2018

1. Suppose $X_1, ..., X_n \overset{iid}{\sim} N(\sigma, \sigma)$ where $\sigma > 0$. a) Find a minimal sufficient statistic for σ. b) Show that $(\bar{X}, S^2)$ is a sufficient statistic but not complete for σ.

2. Let $X_1, ..., X_n$ be a random sample with pdf $f(x) = e^{-(x-\theta)}, x > \theta$. Show that $X_{(1)}$ is a complete sufficient statistic for θ and $X_{(n)} - X_{(1)}$ is an ancillary statistic.

3. CB 6.21

4. Using R, create a likelihood plot (similar to that shown in Slides 3.pdf) for μ and σ^2 from a normal distribution. Choose your own experiment, but please state all of your assumptions.

5. Let $X_1, ..., X_n$ be a random sample with pdf $f(x|\theta) = \theta x^{\theta-1}$ where $\theta > 0$ and $0 < x < 1$, find the maximum likelihood estimator for θ.

6. Let $X_1, ..., X_n$ be a random sample with pdf $f(x|\theta) = (\theta + 1)x^{\theta}$ for $0 < x < 1$ and $\theta > -1$, find the MLE for θ.