36-325/725
Homework 6
due Thursday October 10

(1) Chapter 8 problem 1.

(2) Chapter 8 problem 2.

(3) Chapter 8 problem 4.

(4) Chapter 8 problem 8.

(5) Chapter 8 problem 10 but use means not medians.

(6) Let $X_1, \ldots, X_n \sim \text{Poisson}(\lambda)$ and let $\hat{\lambda} = n^{-1} \sum_{i=1}^n X_i$. Find the bias, se and MSE of this estimator.

(7) Let $X_1, \ldots, X_n \sim \text{Uniform}(0, \theta)$ and let $\hat{\theta} = \max\{X_1, \ldots, X_n\}$. Find the bias, se and MSE of this estimator.

(8) Let $X_1, \ldots, X_n \sim \text{Uniform}(0, \theta)$ and let $\hat{\theta} = 2\overline{X}_n$. Find the bias, se and MSE of this estimator.

(9) Let $X_1, \ldots, X_n \sim \text{Uniform}(0, 1)$. Let $Y_n = \overline{X}_n^2$. Find the limiting distribution of Y_n.

(10) Let

$$\begin{pmatrix} X_{11} \\ X_{21} \end{pmatrix}, \begin{pmatrix} X_{12} \\ X_{22} \end{pmatrix}, \ldots, \begin{pmatrix} X_{1n} \\ X_{2n} \end{pmatrix}$$

be iid random vectors with mean $\mu = (\mu_1, \mu_2)$ and variance Σ. Let

$$\overline{X}_1 = \frac{1}{n} \sum_{i=1}^n X_{1i}, \quad \overline{X}_2 = \frac{1}{n} \sum_{i=1}^n X_{2i}$$

and define $Y_n = \overline{X}_1 / \overline{X}_2$. Find the limiting distribution of Y_n.