

STAT 405-01: Mathematical Statistics I

Problem Set 2

Assigned 2015 September 1
Due 2015 September 8

Show your work on all problems! Be sure to give credit to any collaborators, or outside sources used in solving the problems. Note that if using an outside source to do a calculation, you should use it as a reference for the method, and actually carry out the calculation yourself; it's not sufficient to quote the results of a calculation contained in an outside source.

1 Hogg 1.8.11

2 Hogg 1.9.23

3 Hogg 1.9.2

4 Hogg 1.9.25

5 Hogg 1.9.26

6 Hogg 1.10.2

7 Hogg 1.10.3

8 Extra Credit

- (a) Consider the choice of a single number \hat{x} as an estimator for a random variable X with mean $\mu = E(X)$ and variance $\sigma^2 = V(X)$, and define the mean square error associated with the estimator as $C_2(\hat{x}) = E([\hat{x} - X]^2)$. Show that $C_2(\hat{x})$ is minimized by the choice $\hat{x} = \mu$.
- (b) Assume X is a continuous rv with pdf $f(x)$ and consider the mean absolute error $C_1(\hat{x}) = E(|\hat{x} - X|)$. Show that $C_1(\hat{x})$ is minimized by choosing \hat{x} to be the median, defined by $\int_{-\infty}^{\hat{x}} f(x) dx = \frac{1}{2}$.