Department of Mathematics and Statistics
Semester 112

STAT302 Second Major Exam Sunday March 18, 2012

Name: _____ ID #: _____

1) If $Y_1, Y_2, \ldots, Y_n$ is a random sample from a uniform distribution on $[\theta, \theta+1]$.
   a) Find an unbiased estimator of θ.
   b) Find the MSE($\bar{Y}$) when $\bar{Y}$ is used as an estimator of θ.

2) If $Y_1, Y_2, \ldots, Y_n$ is a random sample from a uniform distribution on $[0, \theta]$.
   a) Show that $\frac{1}{\theta} Y_{(n)}$ is a pivotal quantity.
   b) Use it to find a 95% lower confidence bound for θ.

3) If *Y* has a binomial distribution with *n* trials and success probability *p*, show that *Y/n* is a consistent estimator of p.

4) Let $Y_1, Y_2, \ldots, Y_n$ be a random sample from the probability density function

$$f(y|\theta) = \begin{cases} (\theta+1)y^{\theta}, & 0 < y < 1, \quad \theta > -1 \\ 0 & \textit{otherwise} \end{cases}$$

Find the MLE for θ.

5) Let $Y_1, Y_2, \ldots, Y_n$ be a random sample from the probability density function

$$f(y \mid \beta, \theta) = \begin{cases} \frac{1}{\beta} e^{-\frac{1}{\beta}(y-\theta)}, & y > \theta \\ 0 & \textit{otherwise} \end{cases}$$

a) Find joint sufficient statistics for β and θ.

b) Find a MVUE for β .