Stat 252.01 Winter 2005
Assignment #2

This assignment is due at the beginning of class on Monday, January 24, 2005. You must submit all problems that are marked with an asterix (*). You are encouraged to form study groups and collaborate with others on this assignment. However, the final work you submit must be your own. A piece of advice: *the assignments are worth very little in the computation of your final grade. It is better to suffer through not understanding something now, rather than copying from a friend just for the sake of completion. You will not have that luxury on the exams.* YOUR ASSIGNMENT MUST BE STAPLED AND PROBLEM NUMBERS CLEARLY LABELLED. UNSTAPLED ASSIGNMENTS WILL NOT BE ACCEPTED! DO NOT CROWD YOUR WORK. DO NOT WRITE IN MULTIPLE COLUMNS.
Note that if there are answers in the back of the book, then you need to be especially certain to explain your answer.

1. * Suppose that $Y_1, \dots, Y_n$ constitute a random sample of size n from a population with a uniform distribution on the interval $(0, \theta)$, where θ is unknown. In order to estimate θ we will consider the estimator

$$\hat{\theta} = \min(Y_1, \dots, Y_n).$$

(a) Quickly write down the density of Y_1.

(b) Compute the density of $\hat{\theta}$.

(c) Using your density from **(b)**, find $\mathbb{E}(\hat{\theta})$.

(d) Is $\hat{\theta}$ an unbiased estimator of θ? Why or why not? If it is not an unbiased estimator, then find an estimator of θ which *is* unbiased.

(Note: This exercise outlines a different approach to solving 8.14, page 370 in the text.)

2. * Do the following exercises from Wackerly, et al.

- #8.13, page 370
- #8.30, page 379 (This is quite easy.)
- #8.32, page 380 (This is more challenging.)
- #8.36, #8.37, #8.38, page 384
- #8.43, page 391
- #8.25, page 378
- #8.50, page 393

3. * Say that the data from an experiment will consist of a single observation X from the Exponential(λ) distribution, where λ is unknown. Verify that

$$\left(\frac{-\log(0.95)}{X}, \frac{-\log(.05)}{X} \right)$$

is a 90% confidence interval for λ.