Stat 252.01 Winter 2005
Assignment #3

This assignment is due at the beginning of class on **Monday, January 31, 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. * Do the following problems from Wackerly, et al.

- #8.9, #8.10, page 369
- #8.34, page 380
- #9.1, page 419 (It is acceptable just to cite the solutions for exercise 8.4 when answering this question.)
- #9.4, page 420 (Also explain WHY the text writes "that this implies that $\hat{\theta}_2$ is a markedly superior estimator.")
- #9.7, page 420 (It is important to realize when you can cite previous results, and when you need to derive things from scratch. Note also that $Y_{(1)} := \min(Y_1, \ldots, Y_n)$.)
- #9.57, page 442 (This is meant to be a hard problem.)
- #9.62, #9.64, #9.66(a), page 447

2. * A biologist is studying an animal population of unknown size. For each of five consecutive days, she sets a (big) trap in the morning. In the evening, she counts how many animals wandered into her trap, before releasing them. She would like to estimate both p, the probability that any particular animal will be trapped in any particular day, and k, the total size of the population.

(a) Let Y_i denote the number of animals trapped on day i. The biologist postulates that $Y_1, \ldots, Y_n$ are independent and identically distributed as $Bin(k, p)$. Comment very briefly on whether or not you think this is reasonable.

(b) Assume that data $y_1 = 13$, $y_2 = 15$, $y_3 = 14$, $y_4 = 9$, $y_5 = 12$ are observed. Determine the method of moments estimates for k and p.

(c) What if $y_5 = 5$ had been observed, instead of $y_5 = 12$. Recompute your estimates. Do you have any comments?

(*Note: This is an uncommon use of the $Bin(k, p)$ distribution. Experiments where k is known (fixed by the experimenter) and only p is unknown are much more common.*)