Stat 252.01 Winter 2005
Assignment #9

This assignment is due at the beginning of class on **Monday, April 4, 2005**. 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 exercise from Wackerly, et al.

- #11.56, page 584

2. Refer to Problem #5 on Midterm #2.

(a) Please ensure that you write out and understand a complete solution to this problem. Do not hand it in.

(b) In the setup described by the problem, X is a random variable, and a function of X, namely $\hat{Y} = \beta_0 + \beta_1 X$, is used to predict the random variable Y. The parameters β_0 and β_1 are chosen to minimize $\mathbb{E}[(Y - \hat{Y})^2]$ and are found to be

$$\beta_0 = \mu_y - \beta_1 \mu_x \quad \text{and} \quad \beta_1 = \frac{\sigma_{xy}}{\sigma_x^2}.$$

Using the multi-dimensional second derivative test, verify that β_0 and β_1 are indeed the minimizers of $\mathbb{E}[(Y - \hat{Y})^2]$.

(c) Suppose that the random variables X and Y are uncorrelated so that $\text{cov}(X, Y) = 0$. What is the implication in terms of β_0 and β_1? Discuss. (This "discussion" should fill most of an entire page. Write neatly!)

3. Bonus: If you have taken a course in linear algebra, do the following exercise from Wackerly, et al.

- #11.81, page 605