1. Suppose that $y_i = \mu + e_i$, where $i = 1, 2, \ldots, n$ and the e_i are independent errors with mean 0 and variance σ^2. Show that $\overline{y}$ is the least squares estimate of μ.

2. Suppose that n points $x_1, \ldots\ x_n$ are to be placed in the interval $[-1, 1]$ for fitting the model

$$Y_i = \beta_0 + \beta_1 x_i + \epsilon_i$$

where the ϵ_i are independent with common variance σ^2. How should the x_i be chosen in order to minimize $Var(\widehat{\beta}_1)$?

3. Suppose that grades on a midterm and a final have a correlation coefficient of 0.5 and both exams have the average score 75 and a standard deviation of 10.

(a) If a student's score on the midterm is 95, what would you predict her score on the final to be?

(b) If a student scored 85 on the final, what would you guess that his score on the midterm exam was?

4. Chapter 13, problem 3 (textbook).

5. Chapter 13, problem 6 (textbook). Data is on course website, or http://www.stat.cmu.edu/~larry/all-of-statistics/=data/carmileage.dat