1. Suppose that \( y_i = \mu + \epsilon_i \), where \( i = 1, 2, \ldots, n \) and the \( \epsilon_i \) are independent errors with mean 0 and variance \( \sigma^2 \). Show that \( \bar{y} \) is the least squares estimate of \( \mu \).

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 \( \epsilon_i \) are independent with common variance \( \sigma^2 \). How should the \( x_i \) be chosen in order to minimize \( \text{Var}(\hat{\beta}_1) \)?

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?


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