2.20. A student wonders if people of similar heights tend to date each other. She measures herself, her dormitory roommate, and the women in the adjoining rooms; then she measures the next man each woman dates. Here are the data (heights in inches)

      Women: 66 64 66 65 70 65
      Men: 72 68 70 68 71 65

(a) Make a scatterplot of these data. Based on the scatterplot; do you expect the correlation to be positive or negative? Near ± 1 or not?
(b) Find the correlation r between the heights of the men and women.
(c) How would r change if all the men were 6 inches shorter than the heights given in the table? Does the correlation help answer the question of whether women tend to date men taller than themselves?
(d) If heights were measured in centimeters rather than inches, how would the correlation change? (There are 2.54 centimeters in an inch.)
(e) If every woman dated a man exactly 3 inches taller than herself, what would be the correlation between male and female heights?

2.30. If women always married men who were 2 years older than themselves, what would be the correlation between the ages of husband and wife? (Hint: Draw a scatterplot for several ages.)

2.38. Concrete road pavement gains strength over time as it cures. Highway builders use regression lines to predict the strength after 28 days (when curing is complete) from measurements made after 7 days. Let x be strength after 7 days (in pounds per square inch) and y the strength after 28 days. One set of data gives this least-squares regression line: $\hat{y} = 1389 + 0.96x$.
(a) Draw a graph of this line, with x running from 3000 to 4000 pounds per square inch.
(b) Explain what the slope b = 0.96 in this equation says about how concrete gains strength as it cures.
(c) A test of some new pavement after 7 days shows that its strength is 3300 pounds per square inch. Use the equation of the regression line to predict the strength of this pavement after 28 days. Also draw the "up-and-over" lines from x = 3300 on your graph, as in Figure 2.13.

2.44. A study of class attendance and grades among first-year students at a state university showed that in general students who attended a higher percent of their classes earned higher grades. Class attendance explained 16% of the variation in grade index among the students. What is the numerical value of the correlation between percent of classes attended and grade index?

2.46. The mean height of American women in their early twenties is about 64.5 inches and the standard deviation is about 2.5 inches. The mean height of men the same age is about 68.5 inches, with standard deviation about 2.7 inches. If the correlation between the heights of husbands and wives is about r = 0.5, what is the

equation of the regression line of the husband's height on the wife's height in young couples? Draw a graph of this regression line. Predict the height of the husband of a woman who is 67 inches tall.

2.102. Observational studies suggest that children who watch many hours of television get lower grades in school than those who watch less TV. Explain clearly why these studios do not show that watching TV causes poor grades. In particular, suggest some other variables that may be confounded with heavy tv viewing and may contribute to poor grades.