Multiple Choice

1. A least-squares regression line for predicting performance on a college entrance exam based on high school grade point average (GPA) is determined to be $\widehat{score}$ = 273.5 + 91.2 (GPA). One student in the study had a high school GPA of 3.0 and an exam score of 510. What is the residual for this student?
   a. 26.2
   b. 43.9
   c. -37.1
   d. -26.2
   e. 37.1

2. What is the regression equation for predicting weight from height in the following computer printout?

 | The regression equation is | | | | |
   |---|---|---|---|---|
   | $\widehat{weight}$ = _____ + _____ (height) | | | | |
   | | | | | |
   | Predictor | Coeff | St Dev | t-ratio | P |
   | Constant | -104.64 | 39.19 | -2.67 | 0.037 |
   | Height | 3.4715 | 0.5990 | 5.80 | 0.001 |
   | S = 7.936 | R-sq = 84.8% | | R-sq(adj) = 82.3% | |

   a. $\widehat{weight}$ = -104.64 + 3.4715 (height)
   b. $\widehat{weight}$ = 3.4715 – 104.64 (height)
   c. $\widehat{weight}$ = -104.64 + 39.19 (height)
   d. $\widehat{weight}$ = 3.4715 + 0.5990 (height)
   e. $\widehat{weight}$ = 39.19 – 104.64 (height)

3. Using the computer printout from question #2, what is the value of r?
   a. r = 0.848
   b. r = 0.921
   c. r = -0.921
   d. r = -0.823
   e. r = 0.823

4. Given a set of ordered pairs (x, y) so that s_x = 1.6, s_y = 0.75, r = 0.55. What is the slope of the least-squared regression line for these data.
   a. 1.82
   b. 1.17
   c. 2.18
   d. 0.26
   e. 0.78

5. A study found a correlation of r = -0.58 between hours per week spent watching television and hours per week spent exercising. That is, the more hours spent watching television, the less hours spent exercising per week. Which of the following statements is most accurate?

    a. About one-third of the variation in hours spent exercising can be explained by hours spent watching television.

    b. A person who watches less television will exercise more.

    c. For each hour spent watching television, the predicted decrease in hours spent exercising is 0.58 hours.

    d. There is a cause-and-effect relationship between hours spent watching television and a decline in hours spent exercising.

    e. 58% of the hours spent exercising can be explained by the number of hours watching television.

6. A study was done on the relationship between high school grade point average (GPA) and scores on the SAT. The following 8 scores were from a random sample of students taking the exam:

X (GPA)	3.2	3.8	3.9	3.3	3.6	2.8	2.9	3.5
Y (SAT)	725	752	745	680	700	562	595	730

What percent of the variation in SAT scores is explained by the regression of SAT score on GPA?

    a. 62.1%

    b. 72.3%

    c. 88.8%

    d. 94.2%

    e. 78.8%

7. Consider the following residual plot:
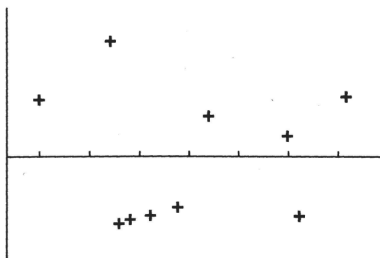
Which of the following statements is (are) true?

I. The residual plot indicates that a line is a reasonable model for the data.

II. The residual plot indicates that there is no relationship between the data.

III. The correlation between the variables is probably non-zero.

    a. I only

    b. II only

    c. I and III only

    d. II and III only

    e. I and II only

8. Consider the following data set:

x	45	73	82	91
y	15	7.9	5.8	3.5

Given that the LSRL for these data is y = 26.211 – 0.25x, what is the value of the residual for 73?
   a. 7.961
   b. 0.061
   c. 36.561
   d. -0.061
   e. -7.961

9. Using the data table and regression line from question #8, which of the following are true about the point (91, 3.5)?
   a. It is above the regression line because the residual is positive.
   b. It is above the regression line because the residual is negative.
   c. It is below the regression line because the residual is positive.
   d. It is below the regression line because the residual is negative.
   e. It is on the regression line because the residual is zero.

10. Measurements are made of the number of cockroaches present, on average, every 3 days, beginning on the second day, after apartments in one part of town are vacated. The data are as follows:

Days	2	5	8	11	14
# Roaches	5.69	11.96	18.23	24.5	30.77

How many cockroaches would you expect to be present after 9 days?
   a. 20.23
   b. 20.32
   c. 21.33
   d. 21.38
   e. 23.41

11. Mrs. De Marre is studying how the length of rides at her favorite theme park affects wait times for the rides. Her findings result in a two-variable data set such that $\bar{x}$ = 2.5 minutes, $\bar{y}$ = 4.2 minutes, s_x = 0.82 minutes, s_y = 1.54 minutes, and r = 0.89.

  a. Determine the equation of the LSRL of wait times on ride length.

  b. What is the value of R^2 and what does it mean in context?

  c. One of Mrs. De Marre's favorite rides is 3.4 minutes long with a wait time of 5.2 minutes. What is the predicted wait time for this ride?

  d. Calculate the value of the residual from part (c).

12. The regional champion in 10 and under 100 m backstroke has had the following winning times (in seconds) over the past 8 years:

Year	1	2	3	4	5	6	7	8
Time	77.3	80.2	77.1	76.4	75.5	75.9	75.1	74.3

How many years until you expect the winning time to be one minute or less? What's wrong with this estimate?

13. Effects of binge drinking A common definition of "binge drinking" is 5 or more drinks at one sitting for men and 4 or more for women. An observational study finds that students who binge drink have lower average GPA than those who don't. Identify a variable that may be confounded with the effects of binge drinking. Explain how confounding might occur.

14. The table of data shows the consumer price of a product compared to production cost of that product.

Production cost $	$0.31	$0.32	$0.35	$0.41	$0.58	$0.87	$0.96	$1.21	$1.59
Consumer cost $	$9.80	$9.85	$10.01	$10.33	$11.31	$13.19	$13.83	$15.79	$19.31
Production cost $	$2.31	$2.40	$4.51	4.52	$4.80	$4.89	$5.00	$6.20	$7.75
Consumer cost $	$28.27	$29.65	$90.64	$91.12	$105.68	$110.84	$117.49	$221.82	$504.08

a. Does a linear model seem appropriate for this data? Why or why not?

b. Find an equation of the LSRL for consumer cost on production cost.

c. Express what R^2 is in context.

d. Estimate the consumer cost of a product whose production cost is $4.51?

e. Calculate the residual for the product in part d.