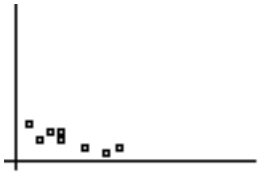
Test 3B AP Statistics Name:

Directions: *Work on these sheets.*

Part 1: Multiple Choice. *Circle the letter corresponding to the best answer.*

1. The correlation *r* for the data in this scatterplot is



(a) Near –1
(b) Clearly negative but not near –1
(c) Near 0
(d) Clearly positive but not near 1
(e) Near 1

2. In the scatterplot in the previous question, if each *x*-value were decreased by one unit and the *y*-values remained the same, then the correlation *r* would
(a) Decrease by 1 unit
(b) Decease slightly
(c) Increase slightly
(d) Stay the same
(e) Can't tell without knowing the data values

3. A regression of the amount of calories in a serving of breakfast cereal vs. the amount of fat gave the following results: Calories = 97.1053 + 9.6525(Fat). Which of the following is FALSE?
(a) It is estimated that for every additional gram of fat in the cereal, the number of calories increases by about 10.
(b) It is estimated that in cereals with no fat, the total amount of calories is about 97.
(c) If a cereal has 2 g of fat, then it is estimated that the total number of calories is about 116.
(d) The correlation between amount of fat and calories is positive.
(e) One cereal has 140 calories and 5 g of fat. Its residual is about 5 cal.

4. Which of the following statements is/are true?
I. Correlation and regression require explanatory and response variables.
II. Scatterplots require that both variables be quantitative.
III. Every least-squares regression line passes through $(\bar{x}, \bar{y})$.
(a) I and II only
(b) I and III only
(c) II and III only
(d) I, II, and III
(e) None of the above

5. A community college announces that the correlation between college entrance exam grades and scholastic achievement was found to be –1.08. On the basis of this you would tell the college that
(a) the entrance exam is a good predictor of success.
(b) the exam is a poor predictor of success.
(c) students who do best on this exam will be poor students.
(d) students at this school are underachieving.
(e) the college should hire a new statistician.

6. A researcher finds that the correlation between the personality traits "greed" and "superciliousness" when both are measured on a numerical scale is –0.40. What percent of the variation in greed can be explained by the relationship with superciliousness?
(a) 0% (b) 16% (c) 20% (d) 40% (e) 60%

7. Scientists rated the activity level of fish at different temperatures (Celsius). A rating of 0 indicates no activity and a rating of 100 indicates extremely heavy activity. The data they collected are given in the table below.

Fish act.	82	65	62	90	51	79	87
Water temp.	21	24	29	18	29	22	20

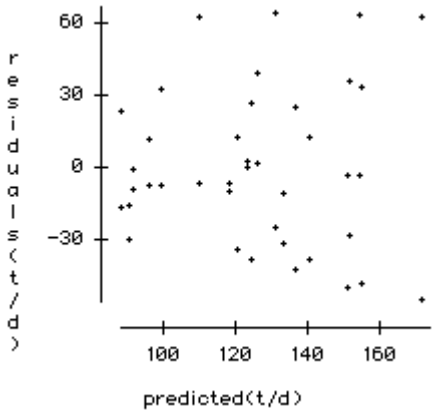
Which of the following statements is true?
(a) The level of fish activity helps explain the water temperature. At low levels of fish activity, the water is cooler. As fish move around more, water temperature increases.
(b) Increasing the water temperature causes the fish to swim faster.
(c) As water temperature decreases, the level of fish activity increases somewhat constantly.
(d) The correlation coefficient, 0.91, indicates that there is a fairly strong positive linear relationship between level of fish activity and temperature.
(e) Based on our sample data, we can safely estimate that the level of fish activity would be about 34 at a temperature of 12 $^{\circ}C$.

8. Ms. Amber Dextrous played a computer game that required her to click as close to the center of a circle that appeared in a random location on the screen as quickly as she could. The computer tracked the distance (in pixels) she had to move from the center of one circle to the next and the time (in hundredths of a second) it took her to make her next click. A computer linear regression printout and a residual plot are shown below.

Dependent variable is: **time**
No Selector
R squared = 35.3% R squared (adjusted) = 33.6%
s = 33.25 with 40 – 2 = 38 degrees of freedom

Source	Sum of Squares	df	Mean Square	F-ratio
Regression	22882.8	1	22882.8	20.7
Residual	42010.3	38	1105.53	

Variable	Coefficient	s.e. of Coeff	t-ratio	prob
Constant	74.7907	12.39	6.03	≤ 0.0001
distance	0.33505	0.07364	4.55	≤ 0.0001



One of the circles was 105 pixels away from the one immediately prior. Which of the following could be the actual time it took Amber to click on that circle?
(a) 1.17 s
(b) 1.10 s
(c) 0.63 s
(d) 1.73 s
(e) 0.789 s

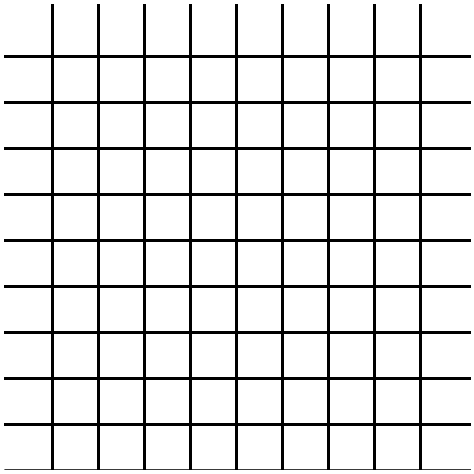
Part 2: Free Response

Answer completely, but be concise. Show your thought process clearly.

A certain psychologist counsels people who are getting divorced. A random sample of five of her patients provided the following data where x = number of years of courtship before marriage, and y = number of years of marriage before divorce.

x	3	0.5	2	1.5	5
y	9	6	14	10	20

9. Construct a scatterplot on the grid provided:



10. Describe the form, direction, and strength of the relationship.

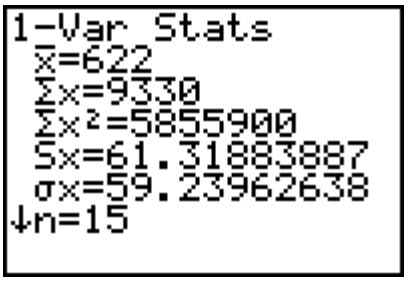
11. Use your calculator to determine the least-squares regression line. Write the equation, and plot this line on your graph. (Be sure to show what information you're using to plot the line.)

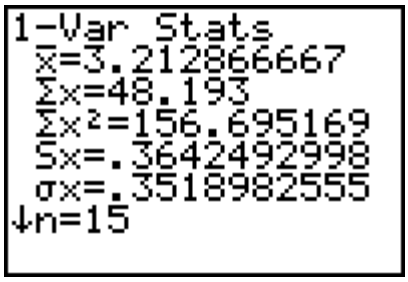
12. Interpret the slope and y intercept of the regression line in the context of the problem.

13. Clearly label the residual for the data point (3, 9) on the grid above and give its value.

14. How well does the linear model you calculated in Question 11 fit the data? Give graphical and numerical evidence to support your answer.

15. Mr. Nerdly asked the students in his AP Statistics class to report their overall grade point averages and their SAT Math scores. Here are some numerical summaries of the grade point averages and SAT Math scores.





$r = 0.66$

Find the equation of the least-squares regression line for predicting GPAs from SAT Math scores. Show your work.

16. Briefly explain the cartoon. Be sure to mention at least one possible lurking variable that helps explain the relationship between height and weight.

<INSERT CARTOON FROM TPS 2E GRB CHAPTER 3>

He says we've ruined his positive association between height and weight.

I pledge that I have neither given nor received aid on this test. _____