REVIEW AP Statistics Name:

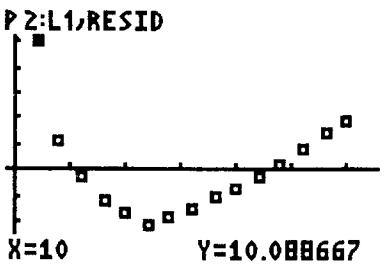
Directions: *Work on these sheets.*

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

1. In a statistics course, a linear regression equation was computed to predict the final exam score from the score on the first test. The equation was $y = 10 + 0.9x$ where y is the final exam score and x is the score on the first test. Carla scored 95 on the first test. What is the predicted value of her score on the final exam?
   (a) 95
   (b) 85.5
   (c) 90
   (d) 95.5
   (e) None of the above

2. Refer to the previous problem. On the final exam Carla scored 98. What is the value of her residual?
   (a) 98
   (b) 2.5
   (c) –2.5
   (d) 0
   (e) None of the above

3. A study of the fuel economy for various automobiles plotted the fuel consumption (in liters of gasoline used per 100 kilometers traveled) vs. speed (in kilometers per hour). A least squares line was fit to the data. Here is the residual plot from this least squares fit.
   What does the pattern of the residuals tell you about the linear model?



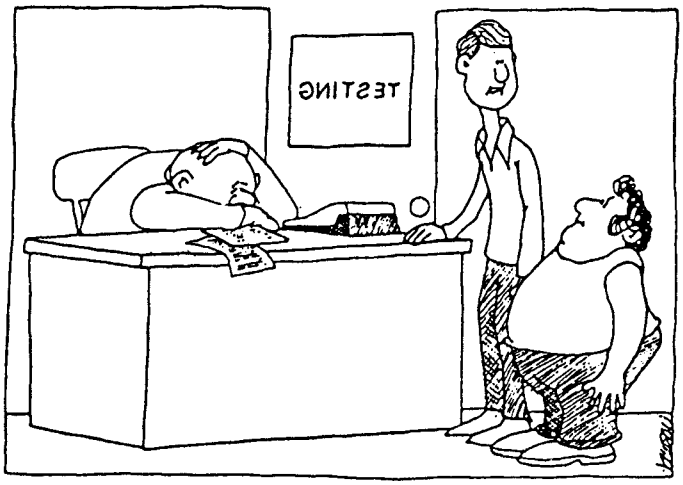
   (a) The evidence is inconclusive.
   (b) The residual plot confirms the linearity of the fuel economy data.
   (c) The residual plot does not confirm the linearity of the data.
   (d) The residual plot clearly contradicts the linearity of the data.
   (e) None of the above

4. All but one of the following statements contains a blunder. Which statement is correct?
   (a) There is a correlation of 0.54 between the position a football player plays and his weight.
   (b) The correlation between planting rate and yield of corn was found to be $r = 0.23$.
   (c) The correlation between the gas mileage of a car and its weight is $r = 0.71$ MPG.
   (d) We found a high correlation ($r = 1.09$) between the height and age of children.
   (e) We found a correlation of $r = -.63$ between gender and political party preference.

Part 2: Free Response

Answer completely, but be concise. Write sequentially and show all steps.

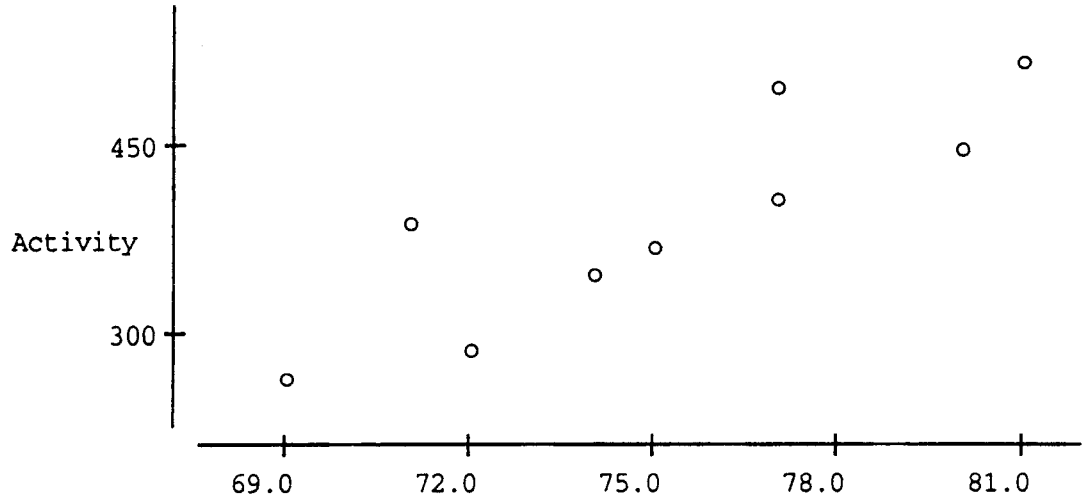
5. Briefly explain the cartoon.



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

Exercises 6–9 relate to the following.

Joey read in his biology book that fish activity increases with water temperature, and he decided to investigate this issue by conducting an experiment. On nine successive days, he measures fish activity and water temperature in his aquarium. Larger values of his measure of fish activity denote more activity. The figure below presents the scatterplot of his data.



6. What does the scatterplot reveal?

7. One of the following numbers is the correlation coefficient between fish activity and water temperature; circle the correct number.

   −0.20 0.03 0.52 0.86

8. Write your best guess for the correlation coefficient for water temperature versus fish activity. Then *briefly* explain your reasoning.

9. Suppose a new point at (66, 500), i.e., water temperature = 66°F and fish activity = 500, is added to the plot. Describe the effect, if any, that this new point will have on the correlation coefficient of fish activity versus water temperature.

Questions 10—14 relate to the following.
At summer camp, one of Carla's counselors told her that air temperature can be determined from the number of cricket chirps per minute.

10. What is the explanatory variable, and what is the response variable? (Note: this is in the context of this problem, not in the biological sense.)
    EXPLANATORY: RESPONSE:

    To determine a formula, Carla collected data on temperature and number of chirps per minute on 12 occasions. She entered the data into lists L_1 and L_2 of her TI-83 and then did STAT / CALC / 2-Var Stats. Here are some of the results:
    $\bar{x} = 166.8$, $s_x = 31.0$ $\bar{y} = 78.83$ $s_y = 9.11$ $r = 0.461$

11. Use this information to determine the equation of the LSRL.

12. One of Carla's data points was recorded on a particularly hot day (93°F). She counted 249 cricket chirps in one minute. What temperature would Carla's model predict for this number of cricket chirps? (Round to the nearest degree.)

13. What is the residual for the data point in question 12?

14. *Suppose* that Carla counted 249 chirps on a day when the temperature was 55°F. If this point were the 13th data point, what effect, if any, would this 13th point have on Carla's LSRL? Explain *briefly*.

15. In general, is correlation a resistant measure of association? _____ Explain briefly or give a simple example to illustrate.

16. Is the least-squares regression line resistant? _____ Explain briefly or give a simple example to illustrate.

Chapter 3 Review

(1) d (2) b (3) d (4) b (5) A positive association would say that the taller you are, the heavier you are. So the tall guy should be heavy, and the short guy should be light. These two fellows don't fit that description. (6) The scatterplot shows a strong positive association. The data appear to be fairly linear; the association is moderately strong. As water temperature increases, fish activity increases. (7) $r = 0.86$ (8) 0.86 again. Because correlation is non-directional. (9) Yes. The r value decreases because this new point is far from the pattern of other points, so the strength of linear association will be weaker. (10) Explanatory: number of cricket chirps. Response: temperature. Note that in *nature*, the temperature helps explain the number of cricket chirps, but this is not how the question is stated. (11) $b = r\,(s_y / s_x) = 0.1355$. We also use the fact that $(\bar{x}, \bar{y})$ is a point on the LSRL. Solving for the parameters a and b, we find $\hat{y}$ = TEMP = 56.23 + .1355 CHIRPS. (12) $\hat{y}$ = 56.23 + .1355(249) = 90°F. (13) Residual = observed TEMP – predicted TEMP = 93 – 90 = 3°F. (14) This 13th point (249, 55) would pull the LSRL toward it. The slope of the LSRL would decrease. (15) No, correlation is not resistant. In the previous problem, the point (249, 55) is far from the line; it would decrease the strength of association. (16) No. Again from the previous problem, the extreme observation (249, 55) would pull the LSRL toward it.