**Inferential Statistics**

**Linear Correlation & Regression**

**LINEAR REGRESSION AND CORRELATION**

Part I Select the correct answer and write the appropriate letter in the space provided.

B 1. Which of the following statements is not correct regarding the coefficient of correlation.

a. It can range from -l to 1.

b. Its square is the coefficient of determination.

c. It measures the percent of variation explained.

d. It Is a measure of the association between two variables.

\_\_\_ 2. The coefficient of determination

a. is usually written as

b. cannot be negative.

C. is the square of the coefficient of correlation.

d. all of the above.

B 3. The coefficient of correlation was computed to be -0.60. This means

a. the coefficient of determination is √60.

b. as X increase Y decreases.

C. X and Y are both 0.

d. as X decreases Y decreases.

A 4. Which of the following is a stronger correlation than -0.54*?*

a. 0.67 b. 0.45

c. 0.0 d. -0.45

\_\_\_ 5. A regression equation is used to

a. measure the association between two variables.

b. estimate the value of the dependent variable based on the independent variable.

c. estimate the value of the independent variable based on the dependent variable.

d. estimate the coefficient of determination.

\_\_\_ 6 A regression equation was computed to be Y'= 35 + 6X. The value of the 35 indicates that

a the regression line crosses the Y axis at 35.

b. the coefficient of correlation is 35.

c. the coefficient of determination is 35.

1. an increase of one unit in X will result in an increase of 35 in Y

\_\_\_ 7. The standard error of estimate

1. is a measure of the variation around the regression line.
2. cannot be negative.
3. is in the same units as the dependent variable.
4. all the above.

\_\_\_ 8. The variable plotted on the horizontal or X-axis in a scatter diagram is called the

a. scatter variable.

b. independent variable.

c. dependent variable.

d. correlation variable.

\_\_ 9. The least squares principle means that

a. Σ(Y-Y')2 =0.

b. Σ(Y-Υ)2 is maximized.

c. Σ(Y-Y')*2* is minimized.

d. Σ(Y-Υ)2 is minimized.

\_\_ 10. If all the points are on the regression line, then

a. the value of b is 0.

b. the value of a is 0.

c. the correlation coefficient is 0.

d. the standard error of estimate is 0.

Part II Record your answers in the space provided. Show all essential work.

11. The correlation between the number of police on the street and the number of crimes committed, for a sample of 15 comparable sized cities, is *0.45.* At the 0.05 significance level is there a positive association in the population between the two variables?

a. State the null and alternate hypotheses.

H0. : There is no correlation between the number of police and the number of crimes

H1. : There is correlation between the number of police and the number of crimes

b. State the decision rule.

c. Compute the value of the test statistic.

1. What is your decision regarding the null hypothesis? Interpret the result.
2. A study is conducted concerning automobile speeds and fuel consumption rates. The following data is collected:

X Speed 45 52 49 60 67 61 334

Y MPG 22 26 21 28 33 32 162

a. Compute the coefficient of correlation.

b. Determine at the 0.05 significance level whether the correlation in the population is greater than zero.

1. Tem Rousos, president of Rousos Ford, believes there is a relationship between the number of new cars sold and the number of sales people on duty. To investigate he selects a sample of eight weeks and determines the number of new cars sold and the number of sales people on duty for that week.

**Week Sales Car**

**1 5 53**

**2 5 47**

**3 7 48**

**4 4 50**

**5 10 58**

**6 12 62**

**7 3 45**

**8 11 60**

**57 423**

a. Determine the coefficient of correlation.

b. Determine the coefficient of determination. Comment on the strength of the association between the two variables.

c**.** Determine the regression equation.

d. Interpret the regression equation. Where does the equation cross the Y-axis? How many additional cars can the dealer expect to sell for each additional salesperson employed?

e. Determine the standard error of estimate.

f**.** Develop a 95 percent confidence interval for all the mean car sales for weeks when the sales staff is at 10.

g. In checking the work schedules for next week, Tern finds there are 10 people scheduled. Develop a 95 percent prediction interval for the number of cars sold next week.