Chapter 6 Review   **Name**_____

1) Fill in the Blank.

Word Choices: Y-Intercept, Common Response, Correlation (r), Form, Slope, Confounding,

Outlier, Regression Line, Linear, Coincidence, Causation.

a)   The _____ measures the strength and direction of linear relationships between

two variables.

b)   In a scatter plot, a/an _____ can dramatically affect the strength of a linear

relationship.

c)   We might describe the _____ of a scatter plot as curved, clustered, random, or

_____ .

d)   A _____ is a straight line that describes how a response variable changes as an

explanatory variable changes.

e)   In a regression line, the _____ can be thought of the starting value of the line and

the _____ can be thought of as the amount that y changes when x changes by one

unit.

f)   Occasionally, there is a strong association between two variables in which both variables are

actually responding to a lurking variable. This situation is called a _____ .

g)   We sometimes see a situation in which one variable seems to affect a second variable, but there

are other variables that may also seem to affect the second variable. We call this situation

_____ .

h)   When two variables have a strong association but, in reality they are entirely unrelated, we say that

this situation is a/an _____.

2)   Use your calculator to find the correlation and the linear regression equation for the data set.
        (2,11) (3,9) (5,5) (7,3) (8,2)

3)   The height, in cm, and length of the middle metacarpal bone, in mm, of 10 skeletons were
        measured (the metacarpal bones are in the hand between the wrist and fingers). The scatter plot is
        given below.

   a) Describe what the scatter plot tells you about the
       direction, form, and strength of the relationship.
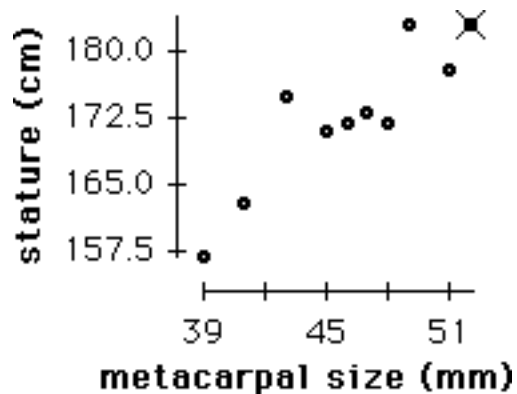

   b) Use a ruler to draw in a line of best fit.

   c) Use your line to estimate the stature for a metacarpal bone measuring 42 mm.

   d) Estimate the height of the skeleton (marked as X) that had a 51 mm metacarpal bone.

   e) If the height and metacarpal length of the skeletons had been measured in inches, instead of
      centimeters and millimeters, how would the correlation between stature and metacarpal length
      for these 10 skeletons have been affected? Explain.

4)   There is a positive correlation between the size of a hospital (measured by number of beds) and the median number of days that patients remain in the hospital. Does this mean that you can shorten a hospital stay by choosing to go to a small hospital? Explain clearly and describe the situation as Cause/Effect, Common Response, Coincidence, or Confounding.

5)   Drinking moderate amounts of wine may help prevent heart attacks. Let's look at data for 19 different countries. Data on yearly wine consumption (liters of alcohol from drinking wine per person) and yearly deaths from heart disease (deaths per 100,000 people) from these 19 countries were entered into a graphing calculator. Two screen shots related to these data are shown.

P1:L3,L4

X=2.9   .   .   Y=131

LinReg
y=a+bx
a=260.5633751
b=-22.96876741
r²=.7103332229
r=-.8428126855
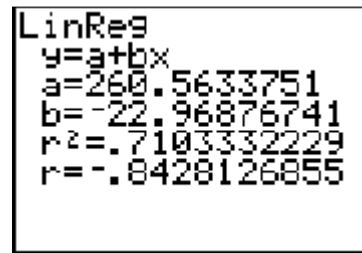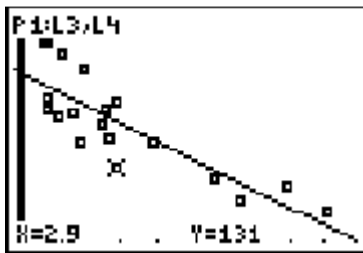
a) What is the explanatory variable in this situation? What is the response variable?

b) What is the equation for the linear regression line?

c) What does the slope of about -23 tell us?

d) What does the y-intercept of about 261 tell us?

e) Use your equation to predict the heart disease death rate in a country where adults average 8 liters of alcohol from wine per year. Show your work.

f) Suppose a country has a death rate of 200 (per 100,000 people). What does the regression equation predict as the wine consumption per person for that country?

A study gathers data on the outside temperature during the winter, in degrees Fahrenheit, and the amount of natural gas a household consumes, in cubic feet per day. Call the temperature x and gas consumption y. The house is heated with gas, so x helps explain y. The least-squares regression line is $y = 1344 - 19x$. The next three questions concern this line.

6) On a day when the temperature is $20°$ F, the regression line predicts that gas used will be about
    (a) 1724 cubic feet   (b) 1383 cubic feet   (c) 1325 cubic feet
    (d) 964 cubic feet   (e) None of these

7) When the temperature goes up 1 degree, what happens to the gas usage predicted by the regression line?
    (a) It goes up 1 cubic foot.
    (b) It goes down 1 cubic foot.
    (c) It goes up 19 cubic feet.
    (d) It goes down 19 cubic feet.
    (e) Can't tell without seeing the data.

8) The correlation between temperature x and gas usage y is $r = -0.7$. Which of the following would *not* change r?
    (a) measuring temperature in degrees Celsius instead of degrees Fahrenheit.
    (b) removing two outliers from the data used to calculate r.
    (c) measuring gas usage in hundreds of cubic feet, so all values of y are divided by 100.
    (d) Both (a) and (c)
    (e) All of (a), (b), and (c)

9) All 753 students in grades 1 through 6 in an elementary school are given a math test that was designed for third graders. The body weights of all 753 students are also recorded. We expect to see _____ between weight and test score.
    (a) positive association
    (b) little or no association
    (c) negative association
    (d) either positive or negative association, but it's hard to predict which

10) A study of the effects of television measured how many hours of television each of 125 grade school children watched per week during a school year and their reading scores. Which variable would you put on the horizontal axis of a scatter plot of the data?
    (a) Hours of television, because it is the response variable.
    (b) Hours of television, because it is the explanatory variable.
    (c) Reading score, because it is the response variable.
    (d) Reading score, because it is the explanatory variable.
    (e) It makes no difference, because there is no explanatory-response distinction in this study.

11) The data below represents the number of people in a stadium (in thousands) and the maximum amount of sound produced in the stadium (in decibels).

People (1000's)	3	11	16	12	8	21	4	7
Noise (Decibels)	85	94	102	90	86	113	79	88

a) Make an accurate scatterplot of the data on the grid below. Scale and label your axes. Also add a title.
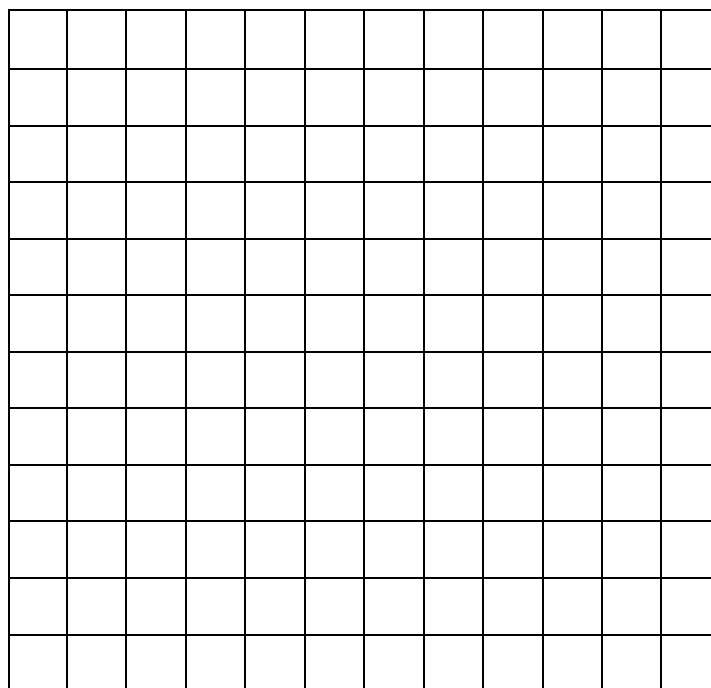
b) Draw in a best-fit line for the scatterplot.

c) Enter the data into your calculator and find the correlation and equation for the linear regression line.

$r =$ _____ $y =$ _____

d) Using the regression line from part (c), predict the noise level if 14,000 people are at the stadium.