**NAME:**

1) Suppose two variables are positively correlated. Does the response variable increase or decrease as the explanatory variable increases?

2) Suppose two variables are negatively correlated. Does the response variable increase or decrease as the explanatory variable increases?

3) Look at the following diagrams. Indicate the type of linear correlation: positive or negative , and whether it is perfect, moderate or low linear correlation.
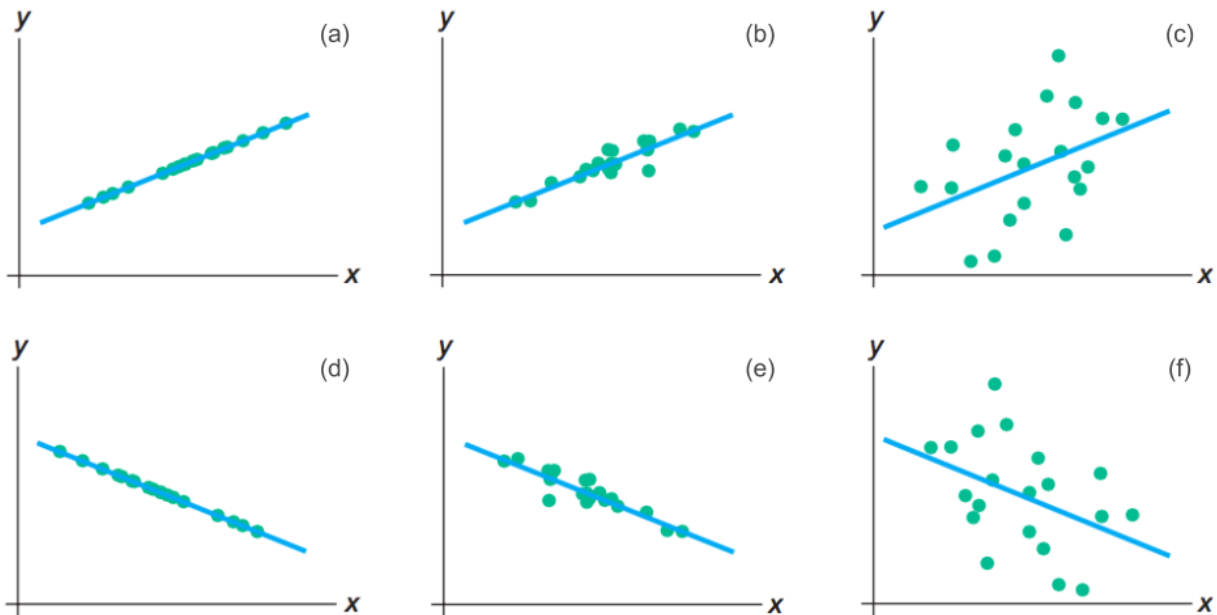
(a)	(b)	(c)
(d)	(e)	(f)

4) Describe the relationship between two variables when the correlation coefficient *r* is:
  a. near -1

  b. near 0

  c. near 1

5) In the least squares line $y = 5 - 2x$:

    a. What is the value of the slope?

    b. When x changes by 1 unit, by how much does y change?

6) In the line $y = 5 + 3x$, What is the marginal change of y for each unit change in x?

7) If two variables have a negative linear correlation, is the slope of the least squares line positive or negative?

8) Let x be the age of the pony (in months), and let y be the average weight of the pony (in kilograms). Make a scatter diagram and draw the line you think best fits the data.

x	y
3	60
6	95
12	140
18	170
24	185

Would you say the correlation is low, moderate, or strong? positive or negative?

9) Consider two lines: A) $y = 3 - 0.6x$,   B) $y = 4 - x$
Complete the tables below for both lines (A) and (B) by computing predictions (y-pred), errors (e), and square errors (e^2) using the given equations:

Line A						Line B				
x	y	y-pred	e	e^2		x	y	y-pred	e	e^2
0	4					0	4			
2	2					2	2			
2	0					2	0			
5	-2					5	-2			
6	1					6	1			

Graph the linear equations and data points for both cases (A) and (B), and determine which line fits the set of data points better, according to the least squares criterion.

For problems 10 and 11 do the following:

    a. Verify the given sums Σx, Σy, Σx^2, Σy^2, and Σxy and the value of the sample correlation coefficient r.

    b. Find the values for $\bar{x}$, $\bar{y}$, a and b. Then find the equation of the least-squares line.

    c. Draw a scatter diagram displaying the data

    d. Graph the least squares line on your scatter diagram. Include the point $(\bar{x}, \bar{y})$ as one of the points on the line.

    e. Find the value of the coefficient of determination r^2.

10) Let x represent the total number of jobs in a given neighborhood, and let y represent the number of entry-level jobs in the same neighborhood.

x	y	x^2	y^2	xy
16	2			
33	3			
50	6			
28	5			
50	9			
25	3			
$\Sigma x =$	$\Sigma y =$	$\Sigma x^2 =$	$\Sigma y^2 =$	$\Sigma xy =$

11) Let x be the weight of cars (in hundreds of pounds), and let y be the miles per gallon (mpg). Do a regression analysis to find out if heavier cars really use more gasoline.

x	y	x^2	y^2	xy
27	30			
44	19			
32	24			
47	13			
23	29			
40	17			
34	21			
52	14			
$\Sigma x =$	$\Sigma y =$	$\Sigma x^2 =$	$\Sigma y^2 =$	$\Sigma xy =$

12) The following results are generated by statistical software. The data comes from analyzing the relationship between elevation (in thousands of feet) and average number of frost-free days per year in Colorado.

Predictor	Coef	SE Coef	T-test	P-value
Intercept	318.16	28.31	11.24	0.002
Elevation	-30.878	3.511	-8.79	0.003
s = 11.8603	R-sq = 96.3%			

a. Use the previous printout to write the least-squares equation

b. For each 1000-foot increase in elevation, how many fewer frost-free days are predicted?

c. The printout gives the value of the coefficient of determination R^2 (*i.e.* R-sq). What is the value of the correlation *r*? Be sure to give the correct sign.