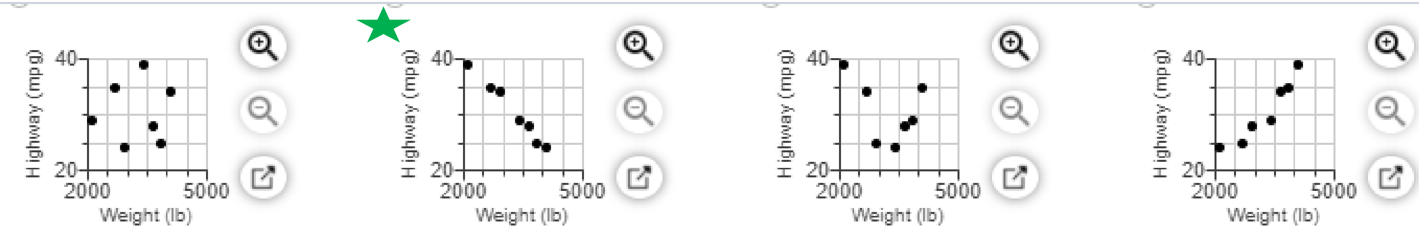
Quiz 4-1-4.3 MATH 241 THOMPSON

1) The table lists weights (pounds) and highway mileage amounts (mpg) for seven automobiles. Use the sample data to construct a scatterplot on your calculator. Use the first variable for the x-axis. Based on the scatterplot, what do you conclude about a linear correlation?

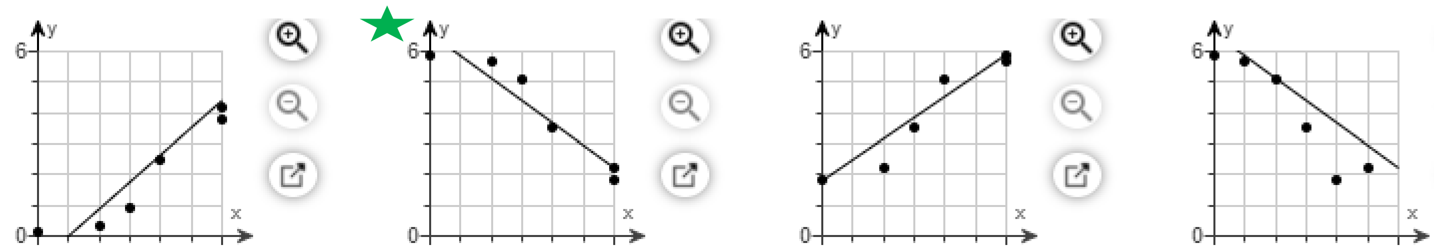
Weight (lb)	2665	2900	3630	3860	4090	2085	3395
Highway (mpg)	35	34	28	25	24	39	29



D. Yes, as the weight increases the highway mileage decreases.

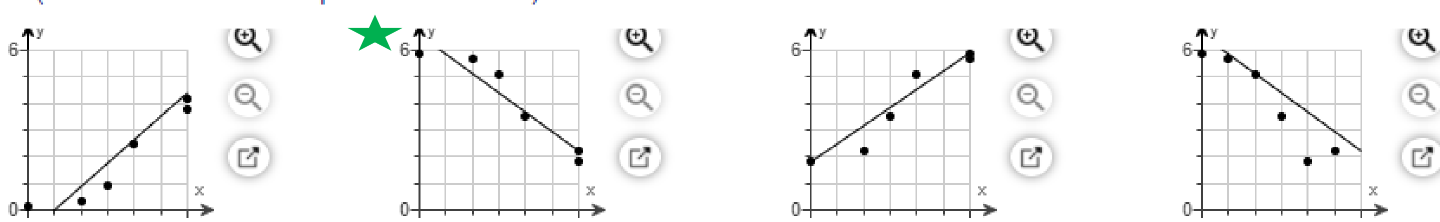
2) **(a)** Draw a scatter diagram. Comment on the type of relation that appears to exist between x and y.
(b) Given that $\bar{x} = 3.5000$, $s_x = 2.3452$, $\bar{y} = 4.0333$, $s_y = 1.7907$, and $r = -0.9525$, determine the least-squares regression line.
(c) Graph the least-squares regression line on the scatter diagram drawn in part (a).

x	0	2	3	4	6	6
y	5.9	5.7	5.1	3.5	1.8	2.2



There appears to be a linear, negative relationship.

(b) $\hat{y} = -.727x + (6.579)$
(Round to three decimal places as needed.)



3) An engineer wants to determine how the weight of a gas-powered car, x, affects gas mileage, y. The accompanying data represent the weights of vario domestic cars and their miles per gallon in the city for the most recent model year. Complete parts (a) through (d) below.

Click here to view the weight and gas mileage data.

(a) Find the least-squares regression line treating weight as the explanatory variable and miles per gallon as the response variable.

$\hat{y} = -.00759x + 45.25$
(Round the x coefficient to five decimal places as needed. Round the constant to two decimal places as needed.)

(b) Interpret the slope and y-intercept, if appropriate. Choose the correct answer below and fill in any answer boxes in your choice.
(Use the answer from part a to find this answer.)

- A. A weightless car will get ☐ miles per gallon, on average. It is not appropriate to interpret the slope.
- B. For every pound added to the weight of the car, gas mileage in the city will decrease by ☐ mile(s) per gallon, on average. A weightless car ☐ miles per gallon, on average.
- ✔ C. For every pound added to the weight of the car, gas mileage in the city will decrease by .00759 mile(s) per gallon, on average. It is not appr to interpret the y-intercept.

(c) A certain gas-powered car weighs 3700 pounds and gets 16 miles per gallon. Is the miles per gallon of this car above average or below average for car of this weight?

$$y = -.00759(3700) + 45.25$$
$$y = 17.167$$

The estimated average miles per gallon for cars of this weight is 17.167 miles per gallon. The miles per gallon of this car is above average cars of this weight.

(d) Would it be reasonable to use the least-squares regression line to predict the miles per gallon of a hybrid gas and electric car? Why or why no

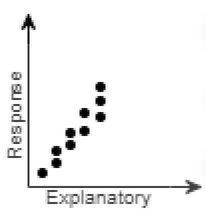
- A. No, because the absolute value of the correlation coefficient is less than the critical value for a sample size of n = 11.
- B. Yes, because the hybrid is partially powered by gas.
- ✔ C. No, because the hybrid is a different type of car.

4) Match the linear correlation coefficient to the scatter diagram.

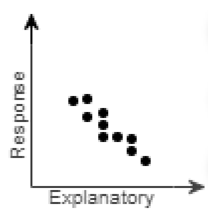
$r = -0.946$

Choose the correct graph below.

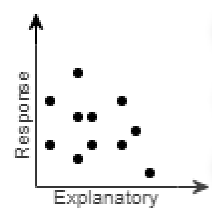
A.



✔ B.



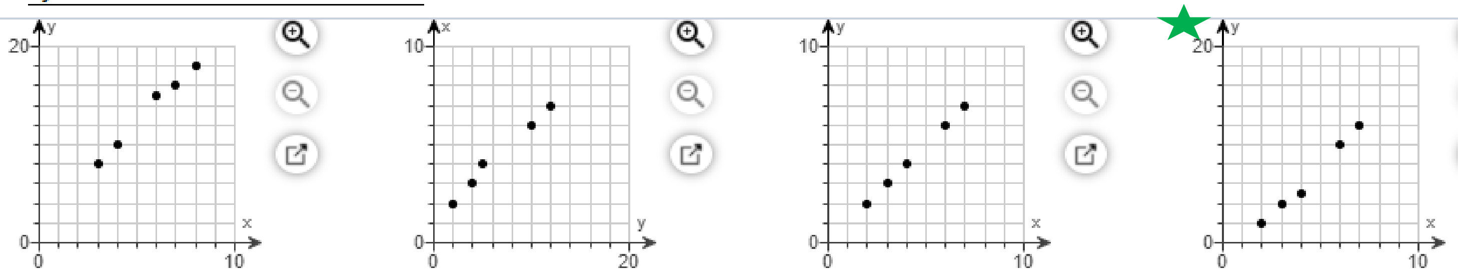
C.



5) Complete parts (a) through (h) for the data below.

x	2	3	4	6	7
y	2	4	5	10	12

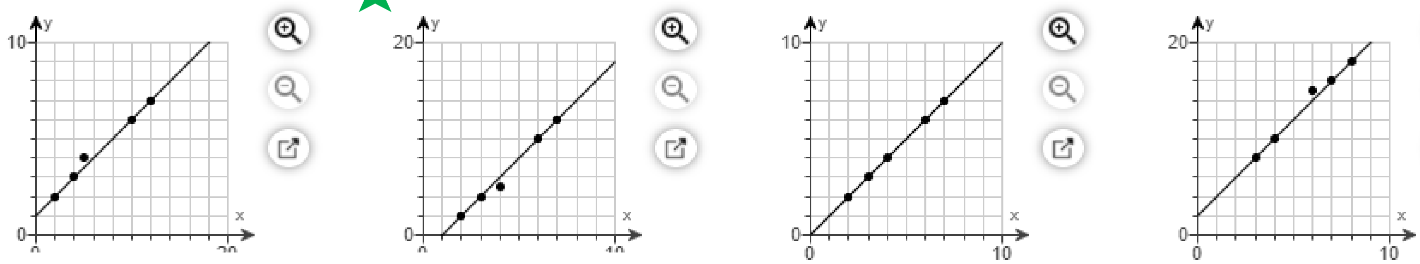
X axis range is 10



(b) Find the equation of the line containing the points (2,2) and (7,12).

$y = 2x + (-2)$

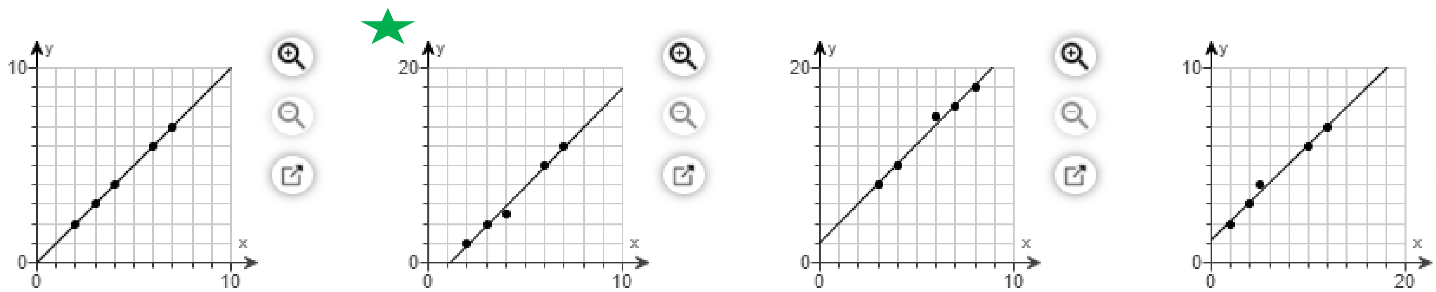
(Type integers or simplified fractions.)



(d) By hand, determine the least-squares regression line.

$\hat{y} = 2.023x + (-2.302)$

(Round to three decimal places as needed.)



compare the original y values from chart and the y values when you plug each x in for y = 2x-2

x	2	3	4	6	7
y	2	4	5	10	12

	x	2	3	4	6	7
y = 2x-2	y	2	4	6	10	12

since there is ONE difference then $1^2 = 1$

**** if it was 4 and 6 then $2^2 = 4$ (only two answers are 1 and 4)**

(f) Compute the sum of the squared residuals for the line found in part (b).

1.000 (Round to three decimal places as needed.)

(g) the first column ERROR row in Table

(g) Compute the sum of the squared residuals for the least-squares regression line found in part (d).

0.791 (Round to three decimal places as needed.)

(h) Comment on the fit of the line found in part (b) versus the least-squares regression line found in part (d).

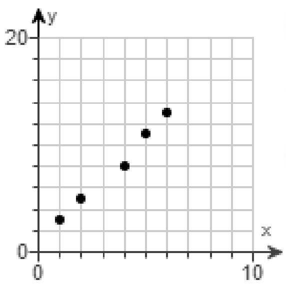
The line in part (b) passes through the most points. The line in part (d) minimizes the sum of the squared residuals, thus being the best-fitting line.

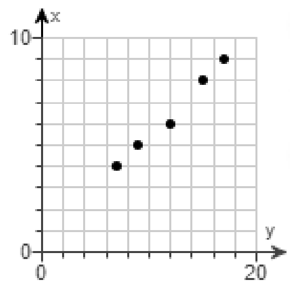
var1	var2
4	7
5	9
6	12
8	15
9	17

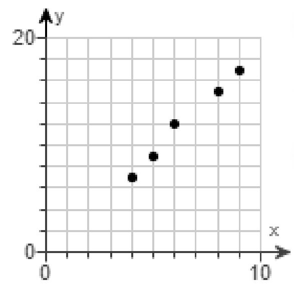
6) open new window statcrunch Graph x-axis range is 10

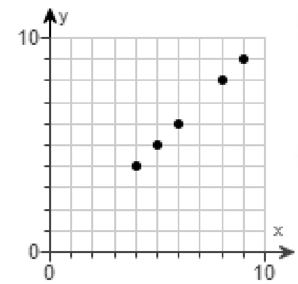
Complete parts (a) through (c) by hand for the data below.

x	4	5	6	8	9
y	7	9	12	15	17









7) Suppose a doctor measures the height, x, and head circumference, y, of 11 children and obtains the data below. The correlation coefficient is 0.860 and the least squares regression line is $\hat{y} = 0.170x + 12.715$. Complete parts (a) and (b) below.

Height, x	27.25	25.5	26.75	25	27.75	26.5	26	27.25	27.25	26.75	26.75
Head Circumference, y	17.3	17.0	17.2	17.0	17.4	17.1	17.1	17.3	17.4	17.4	17.4

(a) Compute the coefficient of determination, R^2.

R^2 = 73.9 % (Round to one decimal place as needed.)

(b) Interpret the coefficient of determination.

Approximately 73.9 % of the variation in head circumference is explained by the least-squares regression model.
(Round to one decimal place as needed.)

Total deviation = unexplained deviation + explained deviation

For the accompanying data set, (a) draw a scatter diagram of the data, (b) compute the correlation coefficient, and (c) determi is a linear relation between x and y.

Click the icon to view the data set.

Click the icon to view the critical values table.

8)

x	2	6	1	7	9
y	3	2	6	9	5

For the accompanying data set, (a) draw a scatter diagram of the data, (b) compute the correlation coefficient, and (c) determine whether the is a linear relation between x and y.

Click the icon to view the data set.

Click the icon to view the critical values table.

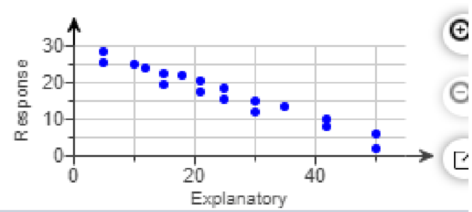
(b) Compute the correlation coefficient.

The correlation coefficient is r = .188 . (Round to three decimal places as needed.)

(c) Determine whether there is a linear relation between x and y.

Because the correlation coefficient is positive and the absolute value of the correlation coefficient, .188 , is not greater than the critical value for this data set, .878 , no linear relation exists between x and y.

9) Determine whether the scatter diagram indicates that a linear relation may exist between the two variables. If the relation is linear, determine whether it indicates a positive or negative association between the variables.
Use this information to answer the following.



Do the two variables have a linear relationship?

A. The data points have a linear relationship because they do not lie mainly in a straight line.

B. The data points do not have a linear relationship because they lie mainly in a straight line.

C. The data points have a linear relationship because they lie mainly in a straight line.

D. The data points do not have a linear relationship because they do not lie mainly in a straight line.

Do the two variables have a positive or a negative association?

A. The two variables have a positive association.

B. The two variables have a negative association.

C. None of the above

Match the coefficient of determination to the scatter diagram. The scales on the x-axis and y-axis are the same for each scatter diagram.
(a) $R^2 = 0.58$ (b) $R^2 = 1$ (c) $R^2 = 0.90$

10)

The closer $r^2 = 1$ the more precise the plots are to the line

III