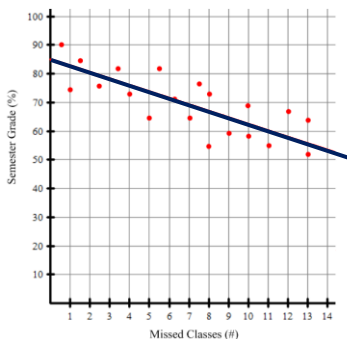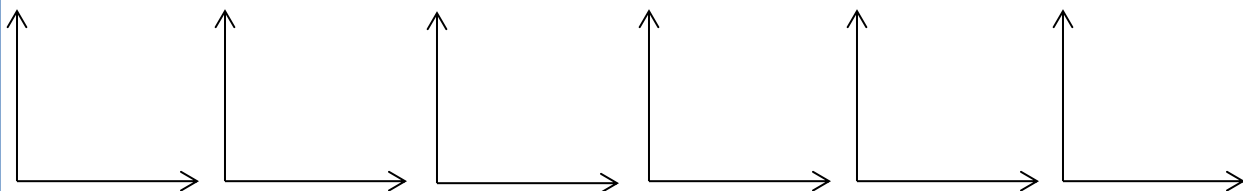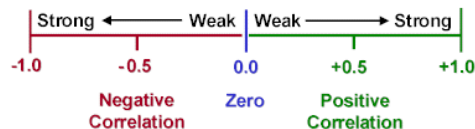# 5.3 Correlation

The scatterplot shows the number of missed classes for a college class and the corresponding semester grade. The equation of the best fit line is $y = -\frac{9}{4}x + 85$ and is graphed below.

Describe the slope of the line.

Describe the y-intercept.

Correlation Coefficient (r-value)

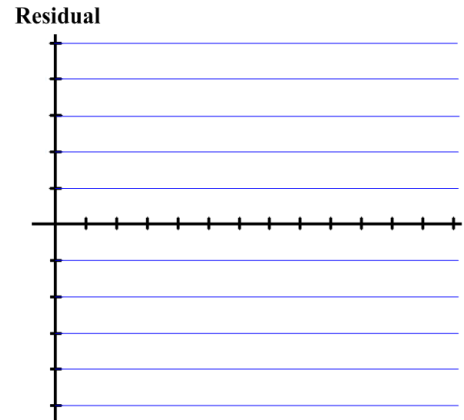## LINEAR REGRESSION

Age and time spent gaming.

Age (years)	Time (minute)
10	85
15	75
20	80
22	78
26	65
30	60
35	48
40	38
44	30
43	50
36	60

AGE VERSUS TIME SPENT GAMING

Residuals

Time (years)	Subscribers (in millions)	Predicted	Residual
0	1.6		
1	2.7		
2	4.4		
3	6.4		
4	8.9		
5	13.1		
6	19.3		
7	28.2		
8	38.2		
9	48.7		
10	60.8		
11	76.3		
12	97		

Time in years since 2005

Residual

Residual Plots

GOOD

Residual

BAD

Residual
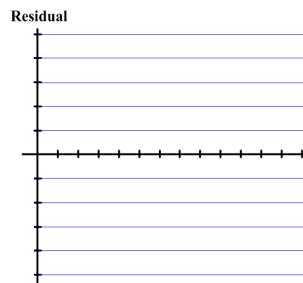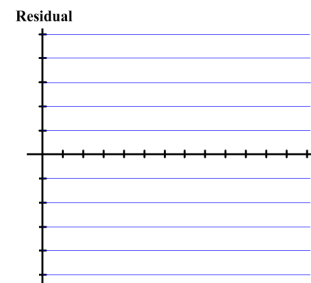
SUMMARY:

Now, summarize your notes here!

5.3 Correlation

PRACTICE

MATCHING – Match the *r* value to the graph

1. $r = 0.5$ matches graph _____
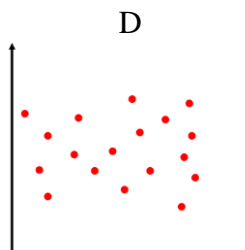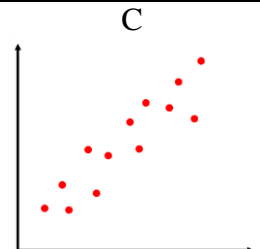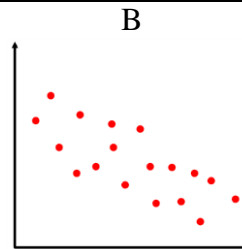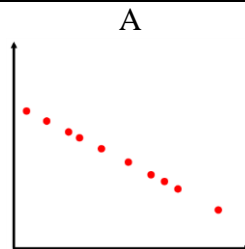
2. $r = 0.8$ matches graph _____

3. $r = -1$ matches graph _____

4. $r = 0$ matches graph _____

5. $r = -0.3$ matches graph _____

6. $r = -0.6$ matches graph _____

A

B

C

D

E

F

7. Sully, Kelly, and Bean are keeping track of their money over time where x stands for time in months and y stands for money in dollars.

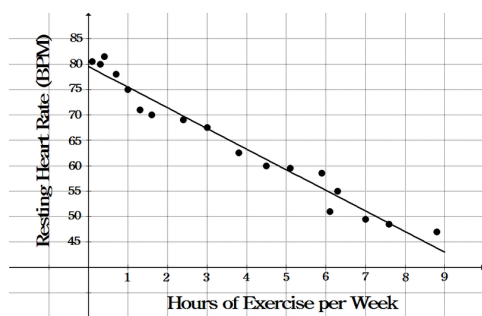SULLY $y = \dfrac{40}{3}x + 500$

slope =

y-intercept =

KELLY $y = -60x + 200$

slope =

y-intercept =

BEAN $y = 25.75x + 400$

slope =

y-intercept =

8.

$r = -4h + 79$

a. Use a sentence to explain the meaning of the slope of the best fit line.
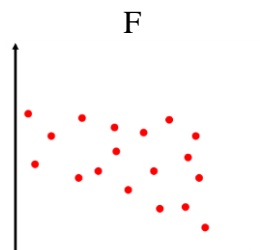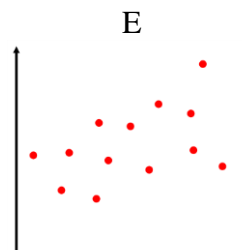
b. Use a sentence to explain the meaning of the *y*-intercept of the best fit line.

c. Use the equation of the best fit line to predict resting heart rate of a person with 8 hours of exercise per week.

d. Circle the best estimate of the *r*-value of the best fit line.

$r = -.75$ $r = -0.5$ $r = 0$ $r = 0.5$ $r = 0.75$

9.

x	y
10	-2
11	-1.5
16	1
7	-3.5
4	-5
-5	-9.5
1	-6.5
-3	-8.5

EQUATION

_____

Correlation Coefficient

_____

Explain the meaning of the correlation coefficient.

10.

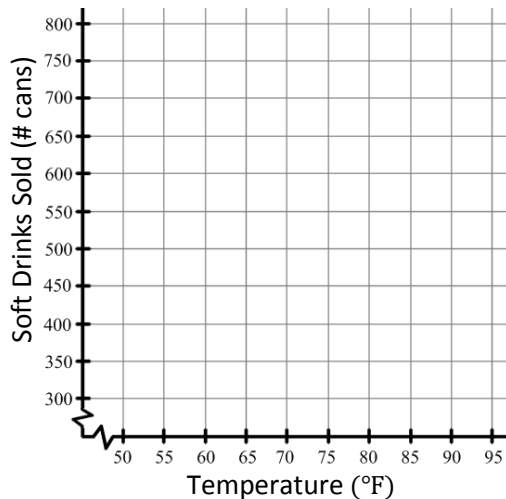| x	y
6.1	19.3
8.7	6.1
9.9	3.2
10.1	3.5
11	2.8
12.9	1.5
15.1	0.3
17.3	0.1

EQUATION

_____

Correlation Coefficient

_____

Explain the meaning of the correlation coefficient.

Construct a scatterplot and answer the questions.

11. Drinks sold at a convenience store.

| Temperature (°F)	55	58	64	68	70	75	80
Soft Drinks Sold (# cans)	340	335	410	460	450	610	735

a. Find and graph a linear regression equation that models the data. (Round to nearest hundredth)

EQUATION:_____

CORRELATION COEFFICIENT:_____

b. Use a sentence to explain what the slope means.

c. Use a sentence to explain what the y-intercept means.

d. How many soft drinks would be sold if the temperature was 60°F ?

e. Find the residual for 70°F.

Do the following residual plots indicate a good fit for a linear model? Justify your answer.

12.

13.

14.

15.

16.

17.
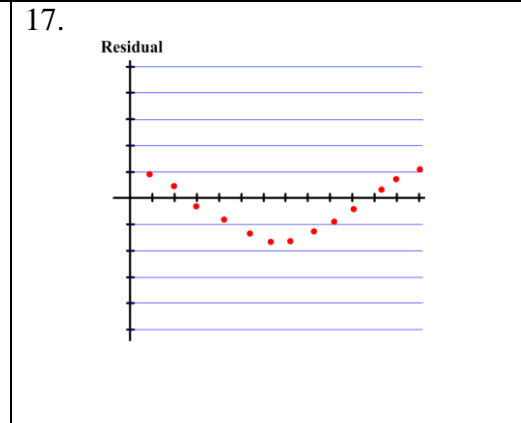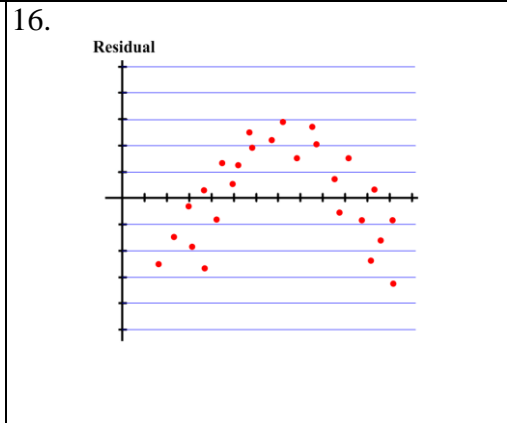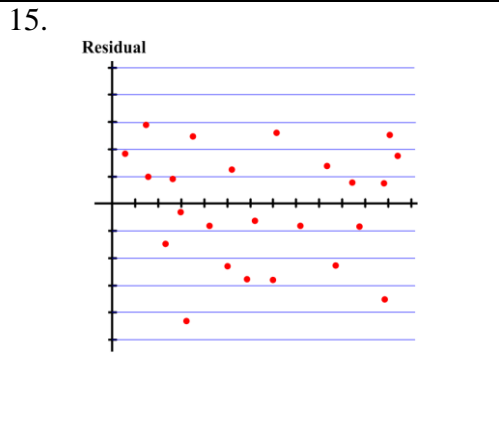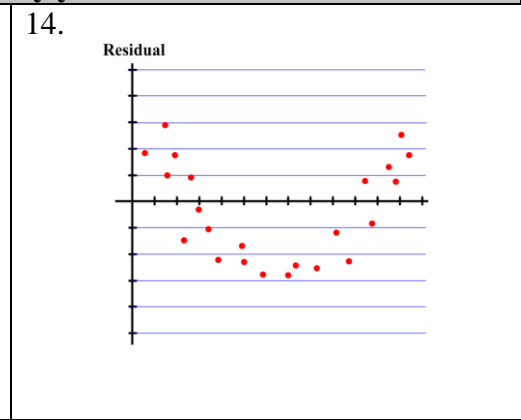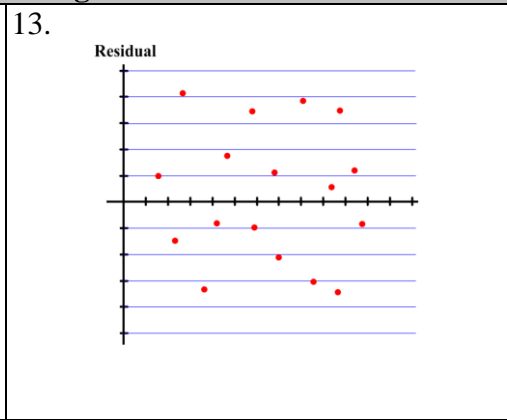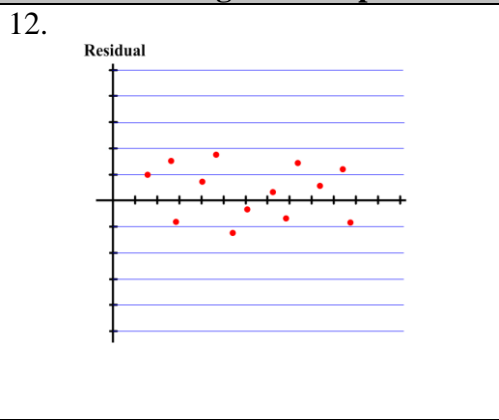
18. The table below shows the shoe sizes and height (in inches) for men.

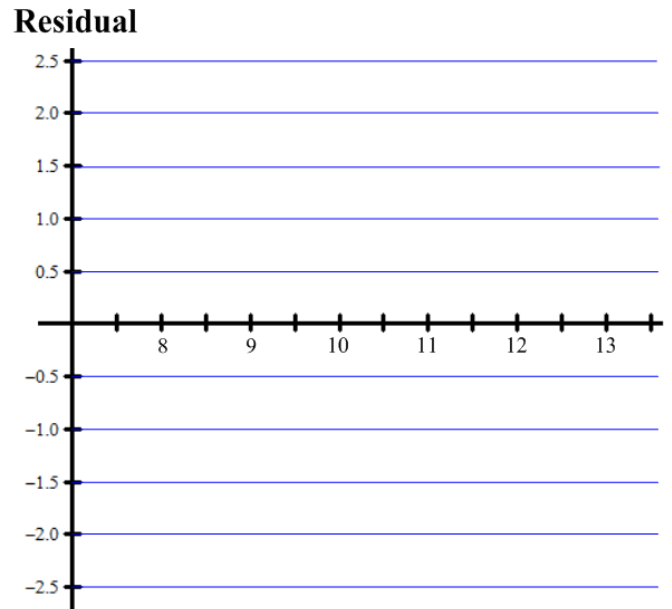   a. Find the equation for the line of best fit and the correlation coefficient. (Round to nearest hundredth)

       EQUATION:_____   CORRELATION COEFFICIENT:_____

    b. Complete the table and create a residual plot.
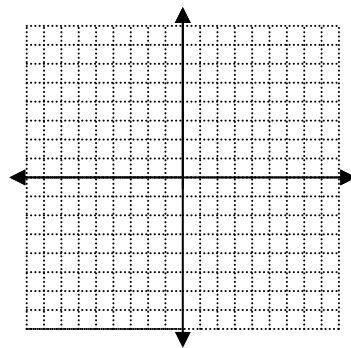
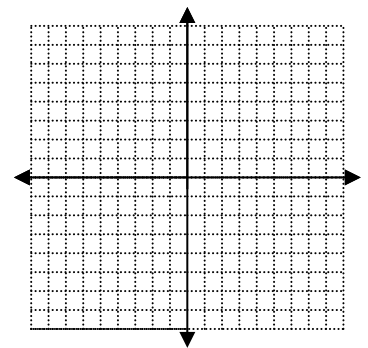| Shoe Size x	Height y	Predicted Height	Residual
8.5	66		
9	68.5		
9	67.5		
9.5	70		
10	70		
10	72		
10.5	71.5		
10.5	69.5		
11	71.5		
11	72		
11	73		
12	73.5		
12	74		
12.5	74		

Residual

    c. Using the residual plot and correlation coefficient, is the prediction line a good model for the data? Explain.

Graph the following.

19. $y > 5 - x$

20. $2x - 3y = 12$
    $x = -3$

Solve the following.

21. $4 - 3(2y - 3) = -5$

22. $4 - \frac{x}{3} = 7$

23. $2x - 3y = -7$
    $y = x + 1$

1. The table below shows the number of grams of carbohydrates, *x*, and the number of calories, *y*, of six different foods.

Carbohydrates (*x*)	Calories (*y*)
8	120
9.5	138
10	147
6	88
7	108
4	62

a. If appropriate, use linear regression to find the line of best fit.
(round to the nearest tenth)

b. Use a sentence to explain the meaning of the slope of the line.

MULTIPLE CHOICE

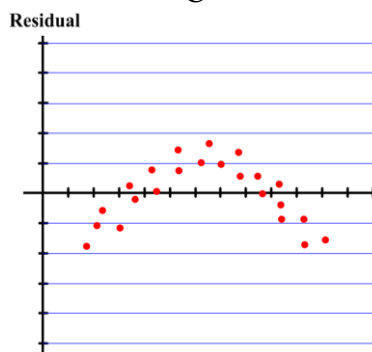2. Which statistic would indicate that a linear equation would NOT be a good fit to model the data set?
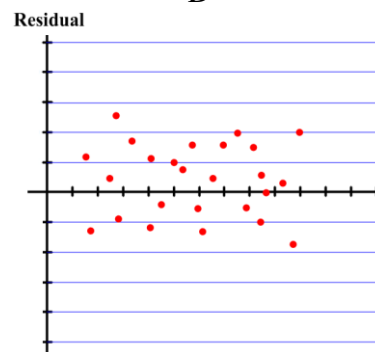
A	B	C	D
$r = -0.93$	$r = 1$	Residual	Residual

EXIT TICKET

A nutritionist collected information about different brands of beef hot dog. She made a table showing the number of Calories and the amount of sodium in each hot dog.

Calories per Beef Hot Dog	186	181	176	149	184	190	158	139
Milligrams of Sodium per Beef Hot Dog	495	477	425	322	482	587	370	322

a. Write the correlation coefficient for the line of best fit. Round your answer to the nearest hundredth.

SMP #4

b. Explain what the correlation coefficient suggests in the context of this problem.