Name_____ Date_____ Period_____
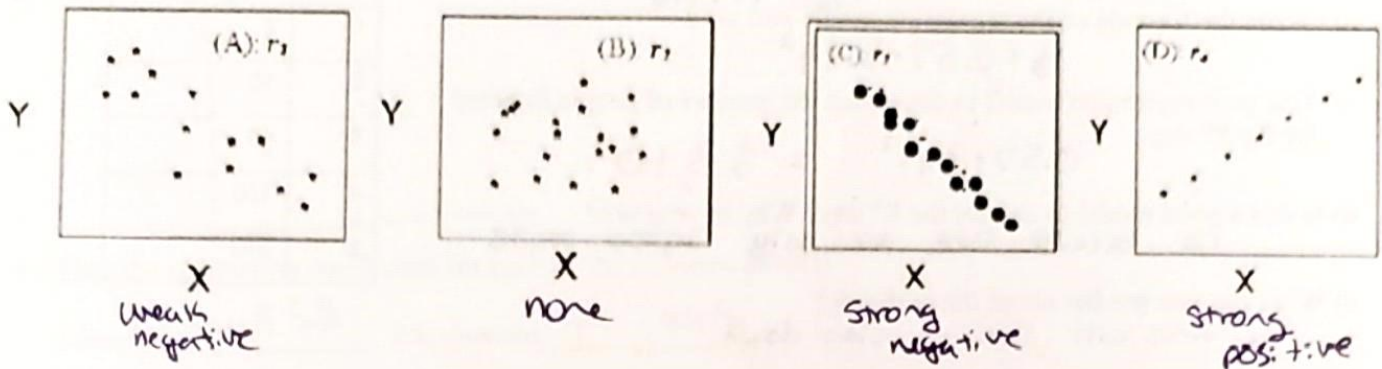
1. For each of the following, determine if it is *strong/weak/no correlation* and *positive/negative*. Then estimate a correlation coefficient (r) using the following: r = -.976, r = 0.451, r = 1, r = -.762

(A): r₁	(B): r₁	(C) r₁	(D) r₄
Y / X	Y / X	Y / X	Y / X
weak negative	none	strong negative	strong positive

2. For each of the following, determine if the statement indicates a correlation or a causation. Also determine if the relationship would be positive or negative

a) The more hours Erica works at her hourly pay job, the more money she makes.

↑ ↑   positive   CAUSATION

b) The temperature outside and the amount of clothes you are wearing.

↑ ↓   negative   causation

c) The more baseball games being played, the more pool drownings that occur.

↑ ??   none   [or]   ↑ ↑ Correlation positive   because baseball has more games in summer and that is when more drownings occur

d) The more cousins a person has, the better golfer they are.

↑ ?   none

e) The more Pamela studies for her test, the better grade she will get.

↑ ↑   positive causation

3. Below is a table that represents the cost of Tony's cell phone bill and how many minutes he talked.

a. What regression model best describes this data?

linear r = 1 ←

exponential r = .999

b. Calculate the regression equation for this data.

$y = 0.25x + 35$

c. Use your regression equation to determine how much it would cost if Tony talked for 65 minutes.

$y = 0.25(65) + 35$ = $51.25

minutes	cost
0	$35.00
4	$36.00
16	$39.00
20	$40.00
28	$42.00
32	$43.00

d. If he paid $60, about how many minutes did Tony talk for?

$60 = 0.25x + 35$
$-35 \qquad -35$
$25 = 0.25x$ $x = 100$ minutes

4. In the movie contagion, the virus spread rapidly. The table below shows the spread of the virus over the first 5 days. Let's assume we are only looking at the population of a small city of 30,000 people.

a) Which regression model should you use for the first 5 days shown in the table below?

linear = r^2 .823
exp = r^2 .998

Day	Total infected
1	2
2	10
3	40
4	120
5	550

b) Write the formula of the regression model you used

$y = 0.57 \cdot 3.94^x$

c) Use your regression model to determine the number of people infected by the 8th day.

$0.57 \cdot 3.94^8 = 33,101$

d) Is this a good model to use for the 8th day? Why or why not?
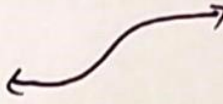
no   because there are only 30,000 people

e) What can you predict about the outbreak?

the virus will have to slow down

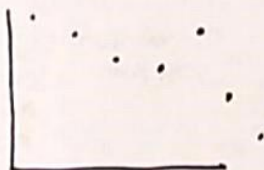f) Sketch a graph of what the *total* spread of the outbreak will look like.

5. Plot the information below and sketch the graph

Price (Thousands of $)	160	180	200	220	240	260	280
Sales of New Homes This Year	126	103	82	75	82	40	20

a. Sketch a graph

b. Find the correlation coefficient for each of the different models

Linear $r = -.954$ Quadratic $R^2 = .917$ Exponential $r = -.904$

c. Which model would be the best? Why?

linear, it has the best correlation coefficient

d. Write the model of the equation you picked.

$y = -.79x + 249.86$

e. If the house was priced at $215 how many sales would expect to happen that year?

$y = -.79(215) + 249.86$

80 new sales

f. If 50 houses were sold how much was the house priced at?

$50 = -.79x + 249.86$
$-249.86 \qquad -249.86$
$-199.86 = -.79x$
$x = 253$

9.

Years since 1890	0	20	40	60	80	100
Population of California (in millions)	1.21	2.38	5.68	10.59	19.97	29.76

a. Sketch a graph

b. Find the correlation coefficient for each of the different models

Linear $r = .955$ Exponential $r = .995$

c. Which model would be the best? Why?
exponential, it has the highest correlation coefficient

d. Write the model of the equation you picked.
$$y = 1.32 \cdot 1.03^x$$

e. Using this model how many people would you predict in California in 2020?   1890 − 2020
$$1.32 \cdot 1.03^{130} \qquad 61.58$$ 130 years

f. At what rate is the population increasing in California? (give answer as percent)
3% the rate is 1.03   so it is
.03 higher than "1"   so   3 %.

10. DesignCo is a local tshirt company. They charge a $25 set-up fee and $8.50 per shirt up to 25 shirts. There is a discount if you buy in bulk. After 25 shirts the price per shirt drops to $5.50 per shirt.

a. How much would 16 shirts cost you?
$25 + 8.50(16) = \$161$

$$\frac{25 + 8.50x}{5.50x}$$

b. How much would 50 shirts cost you?

total of 50 {
  FIRST 25 $= 25 + 8.50(25) = 237.50$
  next   25 $= 5.50(25) = + 137.50$
}

$$\boxed{375}$$