Section 2.7 Regression   Name_____

What is correlation?   What is regression?

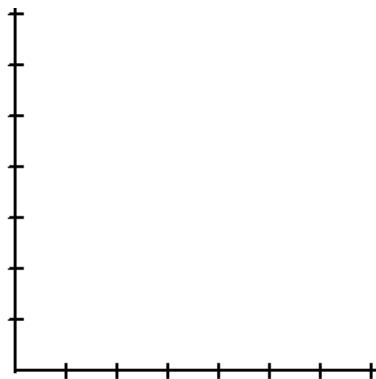What are the four purposes of looking at correlation and regression?
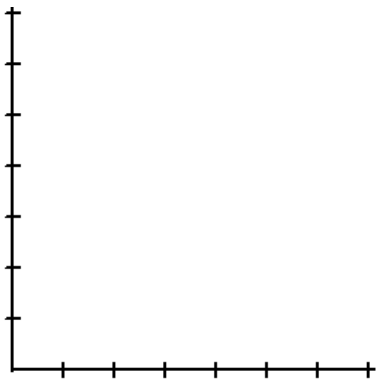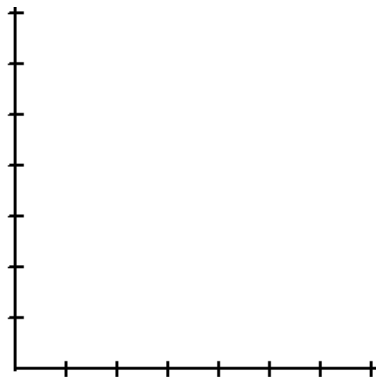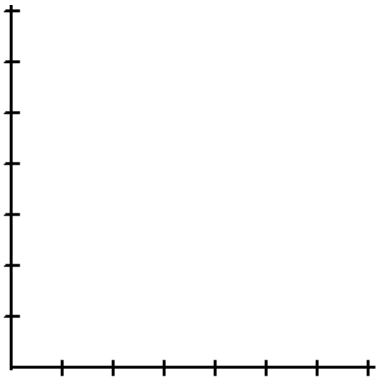
1.   2.

3.   4.

Scatter plots:

What is a correlation coefficient?

[---0---]
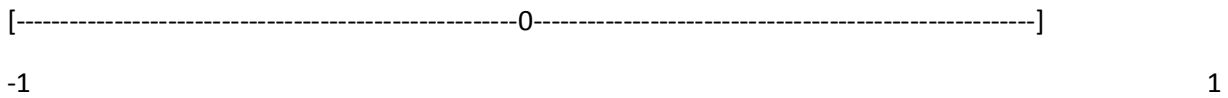
-1   1

STEP 0: Turn "r" on - once this mode is selected, it will stay active until you reset your calc!

Is there a correlation between a rental company's quantity of cars (measured in tens of thousands) and their revenue (in billions)?

DATA:

Company	A	B	C	D	E	F
Cars	63	29	20.8	19.1	13.4	8.5
Revenue	7	3.9	2.1	2.8	1.4	1.5

STEP 1: enter the data

STEP 2: do the LINEAR REGRESSION shortcut

STEP 3: FIND "R"

What does this mean?

STEP 4: Turn on the scatter plots

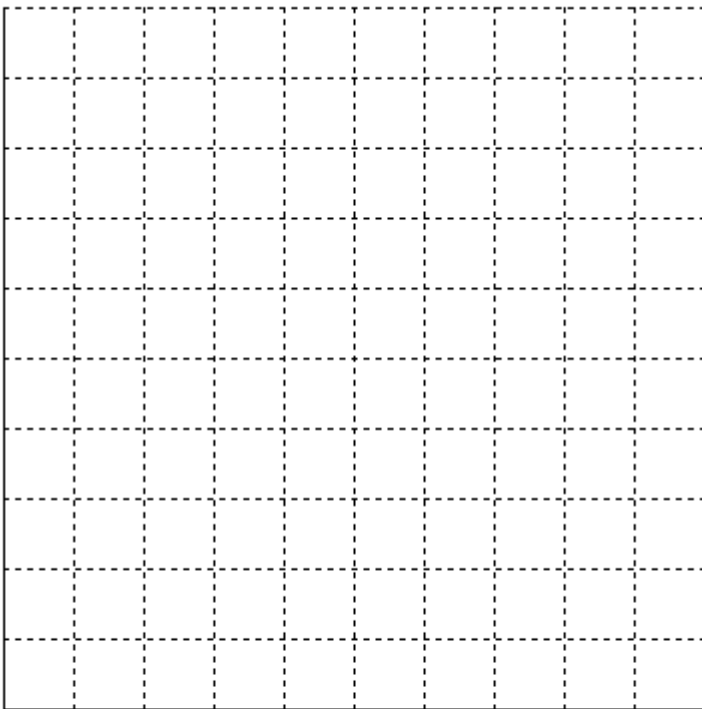STEP 5: Fix your WINDOW

XMIN   YMIN

XMAX   YMAX

XSCL   YSCL

STEP 6: Get your y' on the screen

ex1.   We are looking at a psychological study of homework habits and grades in college math class. Plot the following points and label the x and y axis correctly.

Hrs of HW/Week	7	5	8	7	10	6	4	6	7	8	10	0	3
Math Grade (%)	85	60	75	80	95	50	20	65	70	70	100	20	20

a) Draw a line through the data that you think models the relation between homework and math grades the best.

b) Based on the dots, make an estimate of the correlation

r = _____

c) Use your calculator to find the **linear regression** line for the data on the previous page.

Round to the nearest hundredth

(two decimals)

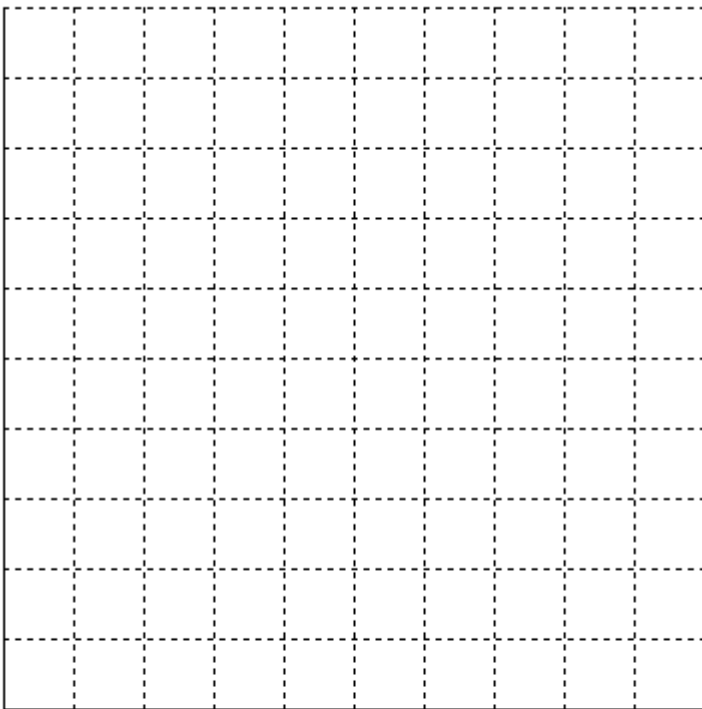d)   Show the scatter plot and the equation on the calc to the teacher _____

e)   What does the R-value tell you? _____

f)   Now square that r-value, we will be using this to compare this to quadratic and exponential regression lines. What is the r-squared value of this graph?

$$R^2 = \text{_____}$$

ex2.   We are looking at a psychological study of television watching habits and grades in math class. Plot the following points below and label the x and y axis correctly.

Hrs of TV/Week	3	5	2	3	0	4	6	4	3	2	0	10	7
Math Grade (%)	60	60	100	80	90	80	20	30	90	70	100	10	30

a) Draw a line through the data that you think models the relation between homework and math grades the best.

b) Based on the dots, make an estimate of the correlation

r = _____

c) Use your calculator to find the **linear regression** line for the data on the previous page.

Round to the nearest hundredth

(two decimals)

d)   Show the scatter plot and the equation on the calc to the teacher _____

e)   What does the R-value tell you? _____

f)   Now square that r-value, we will be using this to compare this to quadratic and exponential regression lines. What is the r-squared value of this graph?
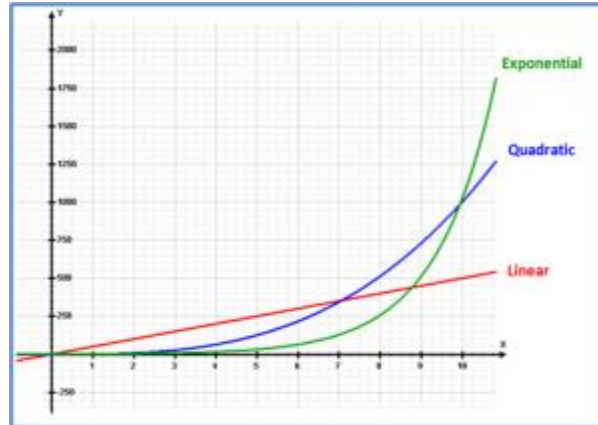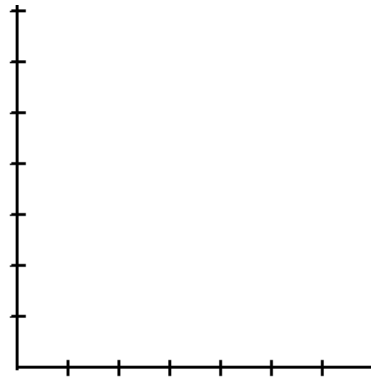
$$R^2 = \text{_____}$$

Quadraic and Exponential Regression

Determining linear growth can be easy.
However, looking at exponential growth
versus quadratic patterns can be difficult
without doing some analysis.
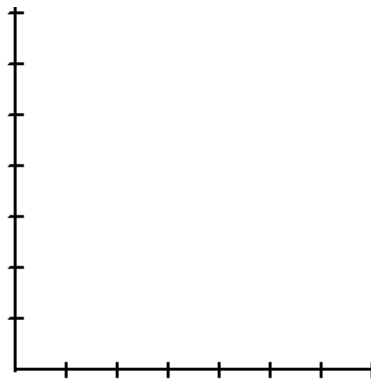
Only when the quadratic LOOKS like a
curve can it be distinguished from an
exponential.

Source: http://www.synchronata.com/

By looking at the regression value we can determine the better line even though many experts debate the validity of r-values when it comes to non-linear regression.

For more on this follow the link below:

http://blog.minitab.com/blog/adventures-in-statistics/

http://blog.minitab.com/blog/adventures-in-statistics/why-is-there-no-r-squared-for-nonlinear-regression

Example 1:

The following shows the world population. Source: www.glencoe.com

Year	1650	1750	1850	1900	1950	2000
n (billions)	.55	.73	1.18	1.6	2.56	6.08

Using your calculator, can find the standard form of the exponential   y = _____

Round to the nearest tenth.

Make an appropriate graph below. Use your table to label a dot for each mark along the x-axis. Label x and y-axis appropriately. Draw a rough sketch of the points in the table AND the line.
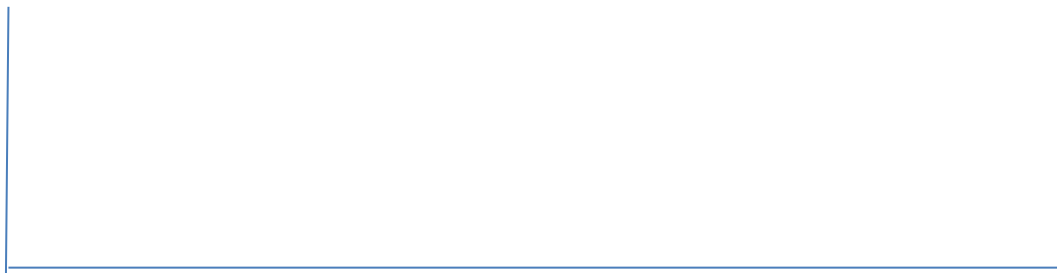
Using the calculator, estimate the number of people in the year 2020.

        2020   _____

Using the equation above, find the year (to the nearest tenth) when the population will hit 10 billion.

        10 billion   _____

Using your calculator, can find the standard form of the quadratic   y = _____

Round to the nearest tenth.

Comparing the two the r-values. Which graph would be the better fit?

_____

Example 2:

The following shows the decline bee population.   Source: USDA (United States Department of Agriculture) and NASS (National Agricultural Statistical Service)

Year	1982	1987	1992	1997	2002	2007
Colonies (millions)	4.4	3.3	3.1	2.6	2.5	2.4

Using your calculator, can find the standard form of the exponential   y = _____

Round to the nearest tenth.

Make an appropriate graph below. Use your table to label a dot for each mark along the x-axis. Label x and y-axis appropriately. Draw a rough sketch of the points in the table AND the line.
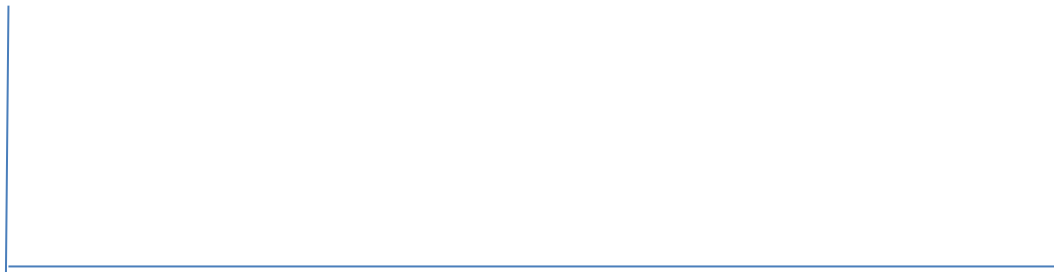
Using the calculator, estimate the number of bees in the year 2020.

2020   _____

Using the equation above, find the year (to the nearest tenth) when bee colonies will decline to 1 million.

1 million   _____

Using your calculator, can find the standard form of the quadratic   y = _____

Round to the nearest tenth.

Comparing the two the r-values. Which graph would be the better fit?

Homework problem 1:

The following shows cell phone sales.

Year	2005	2006	2007	2008	2009	2010
n (billions)	2.1	2.9	3.4	4.1	4.5	5.2

Using your calculator, can find the standard form of the exponential   y = _____

Round to the nearest tenth.

Make an appropriate graph below. Use your table to label a dot for each mark along the x-axis. Label x and y-axis appropriately. Draw a rough sketch of the points in the table AND the line.
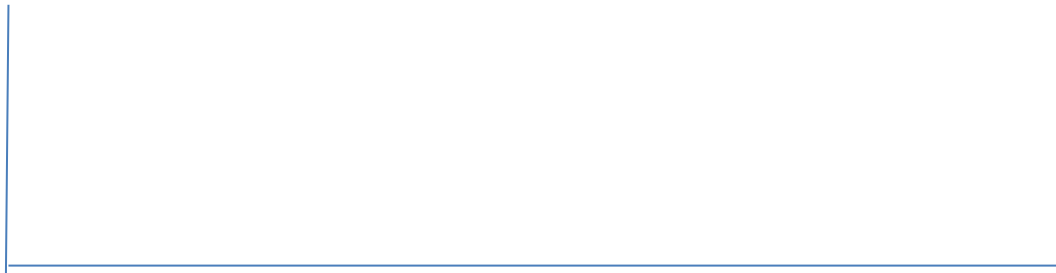
Using the calculator, estimate the number of sales in the year 2020.

        2020   _____

Using the equation above, find the year (to the nearest tenth) when cell phone unit sales will hit 15 billion.

        15 billion   _____

Using your calculator, can find the standard form of the quadratic   y = _____

Round to the nearest tenth.

Comparing the two the r-values. Which graph would be the better fit?

_____

Homework problem 2:

The following shows the decline of aspirin in the body over time.

Time	0	10	20	30	40	50
# of molecules	50	23	10	6	2	1

Using your calculator, can find the standard form of the exponential   y = _____

Round to the nearest tenth.

Make an appropriate graph below. Use your table to label a dot for each mark along the x-axis. Label x and y-axis appropriately. Draw a rough sketch of the points in the table AND the line.
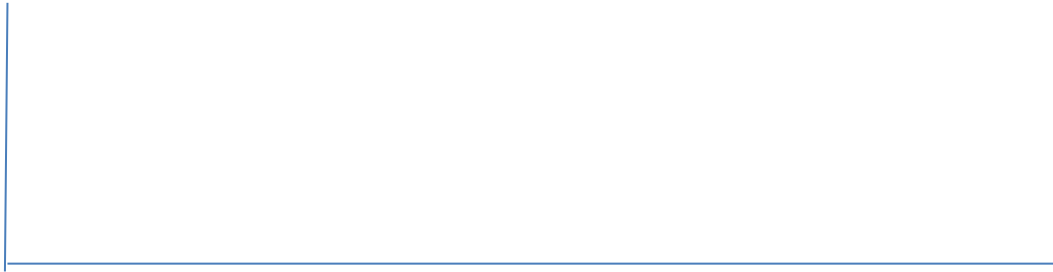
Using the calculator, estimate the number of molecules at 15 minutes.

        15   _____

Using the equation above, find the time (to the nearest tenth) when you will have 40 molecules in your body.

        40   _____

Using your calculator, can find the standard form of the quadratic   y = _____

Round to the nearest tenth.

Comparing the two the r-values. Which graph would be the better fit?