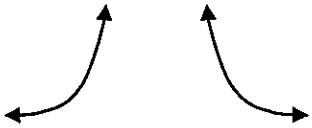
Name: _____ Date: _____

OTHER TYPES OF REGRESSION
COMMON CORE ALGEBRA I

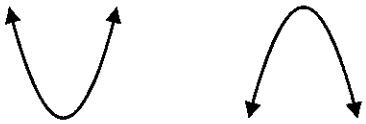
In the last two lessons we fit **bivariate data sets** with **lines of best fit.** Sometimes, though, linear models are not the best choice. We can fit data with all sorts of curves, the most common of which are **linear**, **exponential**, and **quadratic**. But, there are many other types. Before we look at exponential and quadratic regression, recall the general shapes of these two types of functions.

EXPONENTIAL AND QUADRATIC GRAPHS

EXPONENTIAL GRAPHS

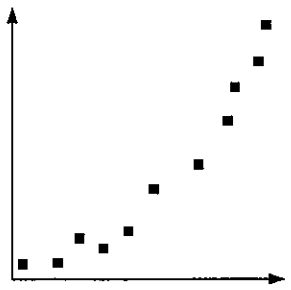


QUADRATIC GRAPHS



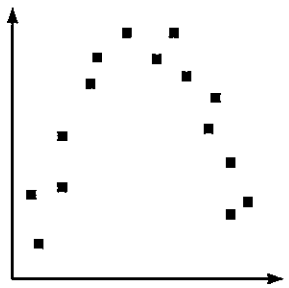
***Exercise* #1:** For each scatterplot shown below, determine if it is best fit with a linear, exponential, or quadratic function. Draw a curve of best fit depending on your choice.

(a)



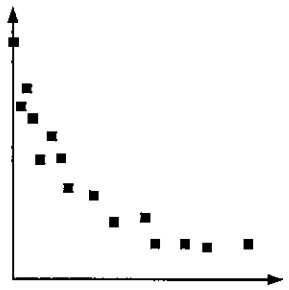
Type: _____

(b)



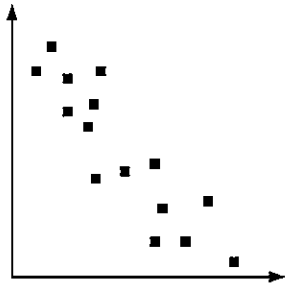
Type: _____

(c)



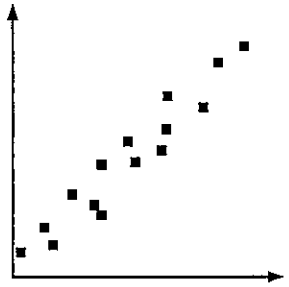
Type: _____

(d)



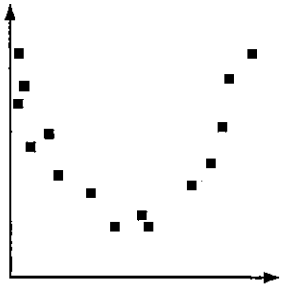
Type: _____

(e)



Type: _____

(f)



Type: _____

Our calculators can produce equations for **exponentials of best fit** and **quadratics of best fit** (along with a lot of other types of curves).

***Exercise* #2:** Biologists are modeling the number of flu cases as it spreads around a particular city. The total number of cases, y, was recorded each day, x, after the total first reached 16. The data for the first week is shown in the table below.

x, days	0	1	3	4	6	7
y, cases	16	18	22	25	33	35

(a) Use your calculator to find the **exponential regression equation** for this data set in the form $y = a(b)^x$ Round all parameters to the nearest *hundredth.*

(b) Based on the regression equation, how many total cases of flu will there be after two weeks?

(c) According to your model, by what percent are the flu cases increasing on a daily basis?

(d) Hospital officials will declare an emergency when the total number of cases exceeds 200. On what day will they need to declare this emergency?

So, really, regression, as mysterious as it may be, is all about finding the best version of whatever curve we think fits the data best.

***Exercise* #3:** The cost per widget produced by a factory generally drops as more are produced but then starts to rise again due to overtime costs and wear on the equipment. Quality control engineers recorded data on the cost per widget compared to the number of widgets produced. Their data is shown below.

Number of widgets, x	35	88	110	135	154	190
Cost per widget, y	9.32	2.63	1.42	1.32	2.12	5.50

(a) Why should a quadratic model be considered for this data set as opposed to linear or exponential?

(b) Use your calculator to create a scatterplot of this data to verify its quadratic nature.