Name________________________

ALGEBRA 2
REGRESSION HANDOUT

1. The table at the right shows the revenue R (in billions of dollars) collected by the Internal Revenue Service (IRS) for selected years from 1960 to 2000.
   (a) Enter the data in a Lists & Spreadsheet page.
   (b) Create a scatter plot of the data.
   (c) Use exponential regression to fit a curve to the graph. Write the equation below.

Year	Revenue
1960	91.8
1965	114.4
1970	195.7
1975	293.8
1980	519.4
1985	742.9
1990	1056.4
1995	1375.7
2000	2096.9

   (d) How good is the fit?
   i. What is r^2? What does this indicate about how well the curve fits the data?

   ii. Are the points balanced on each side of the curve (not clumps)?

   iii. How well does the regression curve predict the future?

   iv. Should this regression curve be used to model this data?

   (e) Use the Table feature to predict the amount of revenue in 2030.

   (f) Add a graph page. Press Tab and find the equation which should be stored in f1. Press enter to graph it. Zoom as needed. Use the graph to determine the year in which the revenue reached 10,000 (billion) dollars.

2. The table at the right shows the yield y (in milligrams) of a chemical reaction after x minutes.
   (a) Enter the data in a Lists & Spreadsheet page.
   (b) Create a scatter plot of the data.
   (c) Use logarithmic regression to fit a curve to the graph. Write the equation below.

Minutes	Yield
1	1.5
2	7.4
3	10.2
4	13.4
5	15.8
6	16.3
7	18.2
8	18.3

   (d) How good is the fit?
   i. What is r^2? What does this indicate about how well the curve fits the data?

   ii. Are the points balanced on each side of the curve (not clumps)?

   iii. How well does the regression curve predict the future?

   iv. Should this regression curve be used to model this data?

(e) Use the Table feature to predict the yield at 10 minutes.

(f) How many minutes (to the nearest tenth) did it take the yield to reach 9 milligrams?

3. The table at the below gives the mean distance x from the sun (in astronomical units) and the time of one orbit y (in Earth years) of the six planets closest to the sun.

Planet	Mercury	Venus	Earth	Mars	Jupiter	Saturn
Distance	0.387	0.723	1.000	1.524	5.203	9.539
Time	0.241	0.615	1.000	1.881	11.862	29.458

(a) Enter the data in a Lists & Spreadsheet page.
(b) Create a scatter plot of the data.
(c) Use power regression to fit a curve to the graph. Write the equation below.

(d) How good is the fit?
   i. What is r^2? What does this indicate about how well the curve fits the data?

   ii. Are the points balanced on each side of the curve (not clumps)?

   iii. How well does the regression curve predict orbit time of planets farther out?

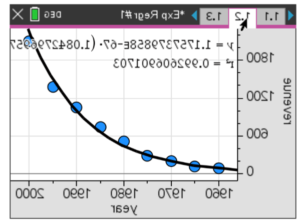
   iv. Should this regression curve be used to model this data?

(e) Use the Table feature to estimate the time period of one orbit of Neptune, which has a mean distance from the sun of 30.043 astronomical units. Round to 3 decimal places.

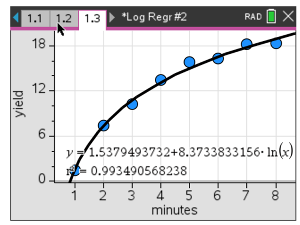
(f) Uranus has a time period of 84.068 years. Determine its average distance from the sun.

ANSWERS

1. a-c) See graph
   d) i)) r^2 = 0.9926; strong fit
      ii) Balanced, but clumps
      iii) Predicts future fairly well (a little steep)
      iv) Yes, it is an acceptable model of this data.
   e) $25,539 (billion) or $25.539 trillion
   f) 2018



2. a-c) See graph
   d) i)) r^2 = 0.993; strong fit
      ii) Very good balance
      iii) Predicts future well (a little steep)
      iv) Yes, it is an acceptable model of this data.
   e) 20.8 mg
   f) 2.4 minutes



3. a-c) See graph
   d) i)) r^2 = 0.9999; strong fit
      ii) Passes through all points perfectly
      iii) Predicts future fairly well (a little steep)
      iv) Yes, it is a very good model of the data.
   f) 164.519 years
   g) 19.2 astronomical units