Math 95 Regression Project

Finding a Regression Model

When analyzing data, we can use technology to find a function that closely approximates the collected values. This process of going from specific points to an equation is called **regression**. On the next page are the steps for using a TI-83 or TI-84 calculator to create a scatterplot and find a ***regression equation*** for a set of data.

Steps for finding a regression equation:

Enter Data:

1. Go to [STAT] and select [1] to go to EDIT.
2. Enter the x-values into L_1 and enter the y-values into L_2.

Creating a scatterplot:

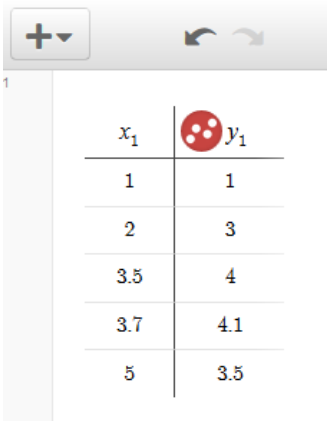
3. Now we need to graph these values in a scatterplot with the following steps.
4. Press [2nd] [Y=] to get the STAT PLOT menu.
5. Choose option [1] to get Plot 1
6. Select [On] to turn the plot on.
7. Choose the scatterplot option.
8. Since we used the lists L_1 and L_2., we do not need to change the Xlist or Ylist. If we did use a different list, we would need to change these.
9. To view the graph, hit the [ZOOM] button and choose ZoomStat which is option 9.

Finding a regression equation:

10. Now if we want find a linear regression, press [STAT] and choose CALC.
11. Choose the type of regression you want. For now, we will use LinReg and QuadReg for linear and quadratic regression.
12. This will send you back to the homescreen. You now just need to hit enter to get your equation.
13. (optional) If you want to store the equation in the equation editor, do this before pressing enter: Type a left-parenthesis, go to [Vars]→[Y-Vars] and select [Y1], type a right –parenthesis, then hit enter. Hit the [Y=] button to see your equation stored.

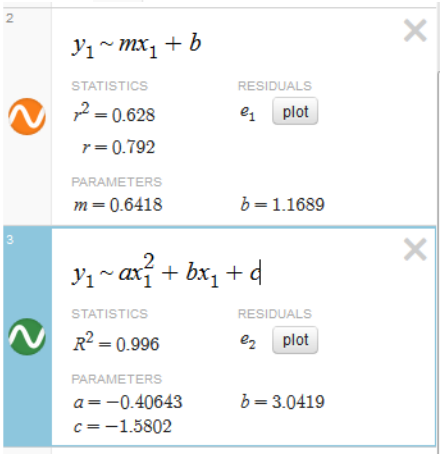
Regression using Desmos.com

Make a table and enter data



x_1	y_1
1	1
2	3
3.5	4
3.7	4.1
5	3.5

1. Use the statistics approximation function ~ to type the general regression forms (don't forget the subscript "1" after the variables):
   Linear: $y_1 \sim mx_1 + b$
   Quadratic: $y_1 \sim ax_1^2 + bx_1 + c$
   Exponential: $y_1 \sim a(b^{x_1}) + c$
   Logarithmic: $y_1 \sim a\ln(x_1 + c)$
2. To extrapolate another value using this function, write the function with a number in place of x. If $x = 25$, type
   Linear: $m(25) + b$
   Quadratic: $a(25)^2 + b(25) + c$
   Then compute a specific value like $f(25)$



Modeling Data

We often want to model real-world data with a function to predict future values. We will now see how we can create exponential or logarithmic curves to fit given data. When we start from data and find a function, this is called a **regression function.**

Problem 1: The data for the world population is shown below. Use your graphing calculator to find the given regression functions and use them to make a prediction for the population in 2018

Year		1950	1960	1970	1980	1990	2000	2006
Number of years from 1949	x	1	11	21	31	41	51	57
World Population (in Billions)	y	2.6	3.0	3.7	4.5	5.3	6.1	6.5

	Linear	Quadratic	Exponential
Regression Equation			
2018 Prediction			

Which Model is a better fit?

Problem 2 : The data for the number of weight loss surgeries per year.

Year		2002	2003	2004	2005	2006
Number of years after 2001	x	1	2	3	4	5
Number of weight loss surgeries (in thousands)	y	63	103	141	171	178

a) Find a logarithmic regression model to fit the data.

b) Predict how many surgeries will be performed in 2020