Handout 11 – Linear Regressions on Desmos – A tutorial

Algebra II

This handout is meant to support you in learning how to use Desmos to create lines of best fit using regression modeling.

So, go to https://preview.desmos.com/calculator and enter the following data into a table.

This is the data taken from a group of people trying to fill in different-sized circles with pennies.

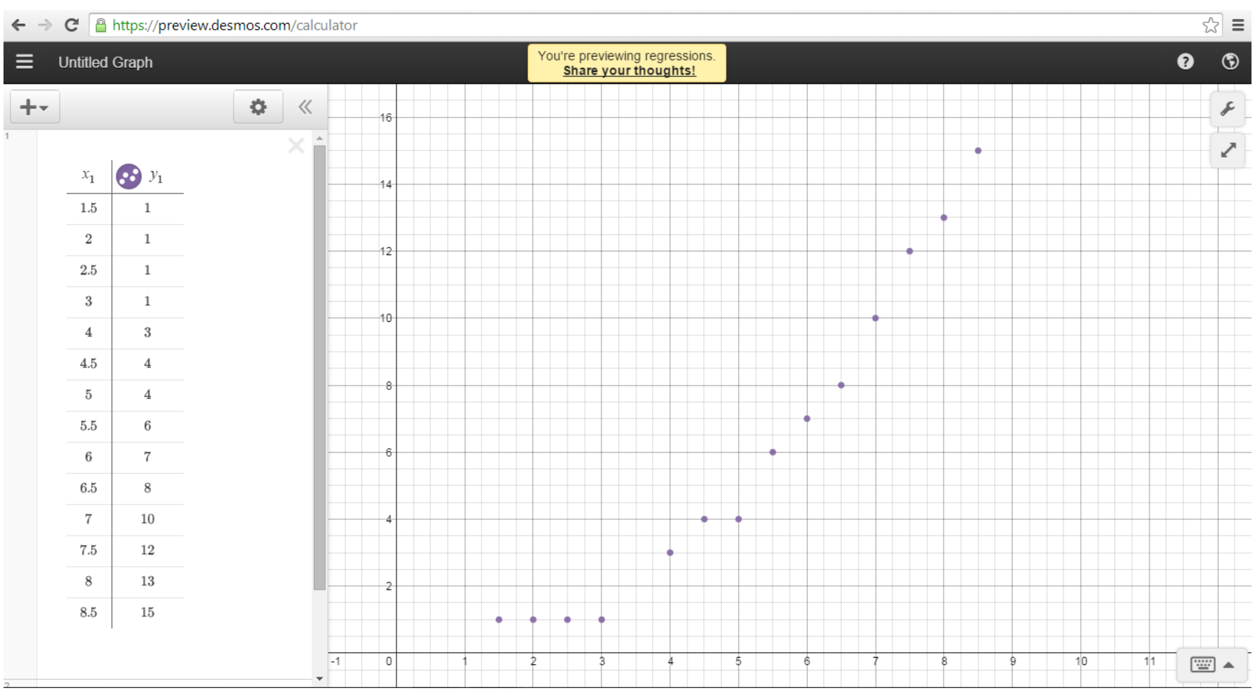
Diameter (cm)	# of pennies
0	0
1.5	1
2	1
2.5	1
3	1
4	3
4.5	4
5	4
5.5	6
6	7
6.5	8
7	10
7.5	12
8	13
8.5	15

Once you've created your table, make sure to adjust your window settings so that your data is completely visible.

The questions we are going to try to answer are:

1. Which **function family** best represents this data?
2. What is the **function rule** that best models this data?
3. **How well** does that function rule model the data?

It probably looks something like this:



Just by looking at the data, it can be a little tough to tell it would be best modeled by a function from the linear family or a function from the quadratic family.

So, let's explore both.

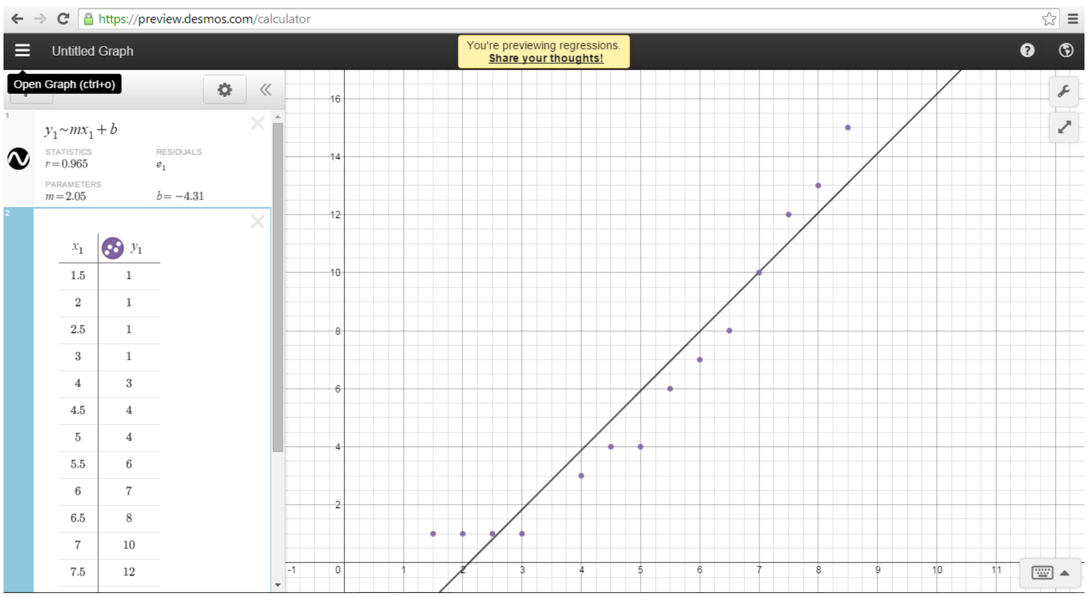
We'll have to explore them one at a time. We'll start with linear.

The most familiar form of linear function is slope-intercept form, y = mx + b. We are going to ask Desmos to show us the best possible linear function to model the data in our table.

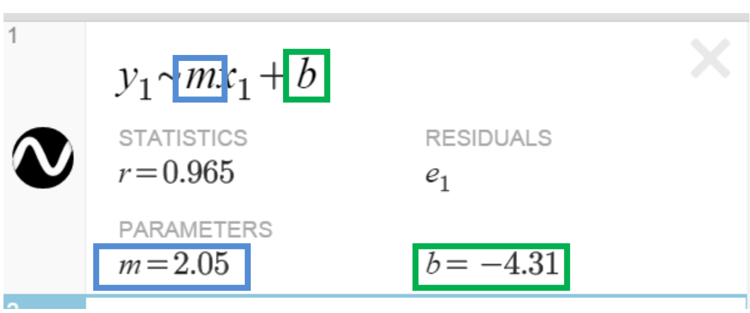
Click "+" to add an expression and type in "y1~mx1+b"

You should see a line appear on the graph and some values appear under the expression.

It should look like this:



Let's look at the values under the expression.



The "parameters" tell you the specifics about your best fit function rule.

The function rule of the linear best fit function is:

y = 2.05x – 4.31

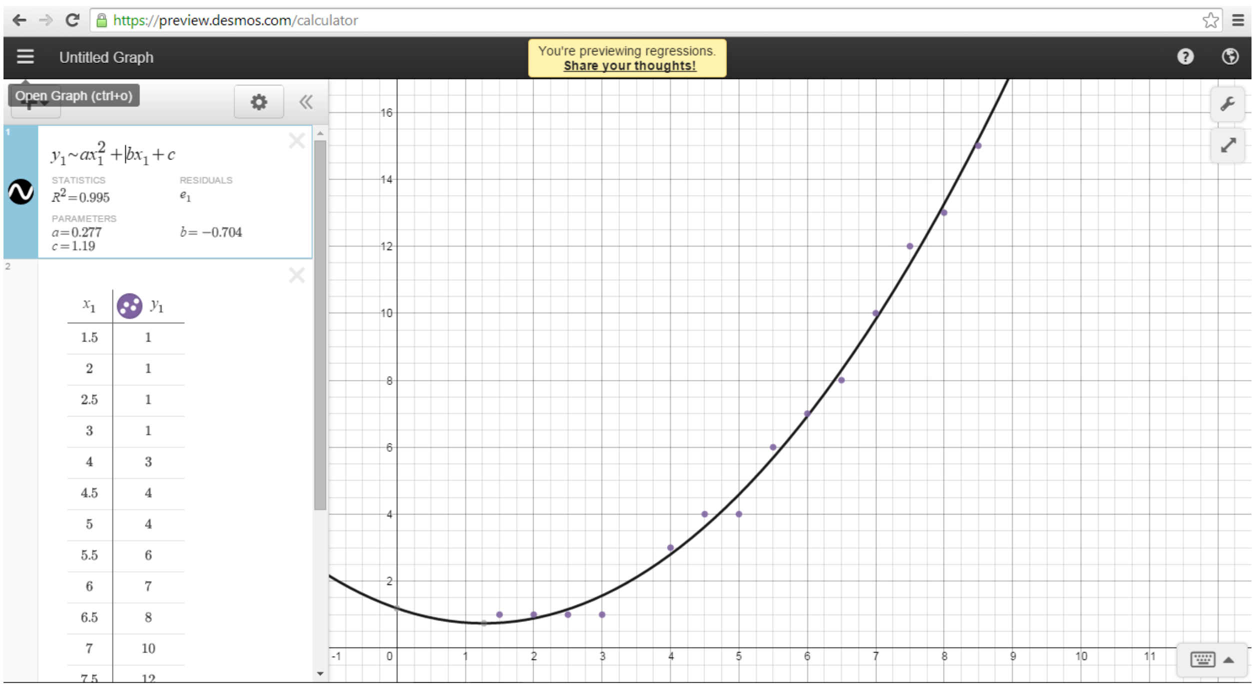
"r" is the **CORRELATION COEFFICIENT**. The correlation coefficient acts like a rating system telling you how well the best fit line represents the data. "r" will always be between 0 and 1. The closer the correlation coefficient gets to 1, the better the best fit function models the data.

If r is positive, it tells you there's a positive correlation. If r is negative, it tells you there's a negative correlation.

So, now let's model this data with a quadratic and see if the correlation coefficient gets closer to 1.

Remember, the general expression for a quadratic function is y = ax^2 + bx + c.

So, delete the expression in line 1, and type in y1 ~ $ax1^2$ + bx1 + c.



So, the function rule for the best fit line is y = .277x^2 - .704x + 1.19.

And notice also, that now the correlation coefficient is much closer to 1.

The conclusion that we can draw is that this data set is much more realistically modeled by a quadratic function that a linear one.

To model the other function families:

Linear	y1 ~ mx1+b
Quadratic	y1 ~ $ax1^2$ + bx1 + c
Cubic	y1 ~ $ax1^3$ + $bx1^2$ + cx1 + d
Square Root	y1 ~ a$\sqrt{x1}$ + b