Math 1314
Lesson 3
Spreadsheet View, Making a List and Regressions Using GeoGebra

When you are given raw data about a quantity, rather than a function, you will need to have a method for finding a function that "fits" the data that is given – that is, a function that passes through or passes close to many or most of the points of data that are given. These equations are called **regression equations**. You'll be able to use GGB to find these.

The GGB commands for creating a polynomial, exponential and power regression models are listed below:

- fitpoly[<list of points>, <degree of polynomial>]—*for creating a polynomial function*

  For polynomials functions:
  - Linear function indicates the polynomial is of degree 1.
  - Quadratic function indicates the polynomial is of degree 2.
  - Cubic function indicates the polynomial is of degree 3.
  - Quartic function indicates the polynomial is of degree 4.

- fitexp[<list of points>]—*for creating an exponential function*

- fitpow[<list of points>]—*for creating a power function*

To create one of these regression models in GGB:

1. Access the Spreadsheet mode in GGB by clicking on the "View" menu and selecting "Spreadsheet".
2. Create a list of points (ordered pairs) using the Spreadsheet window. Enter the *x*-values in one column and the corresponding *y*-values in the next column.

3. Highlight these two columns and select the icon at the top left area of the GGB window, click the bottom right corner of the icon and choose "Create List of Points".
4. A window will appear with the default name "list1" for the list of points, rename it if you'd like. Then click "Create".

You may now create a regression models for the given data.

Example 1: Suppose you are given the data shown in the table below. Find a linear, quadratic, exponential, and power function for the data.

| x	1	2	3	4	5	6
y	1.6	2.5	3.9	4.3	5.8	6.4

Step 1 and Step 2: Access the Spreadsheet mode in GGB by clicking on the "View" menu and selecting "Spreadsheet". Create a list of points (ordered pairs) using the Spreadsheet window. Enter the *x*-values in one column and the corresponding *y*-values in the next column.
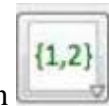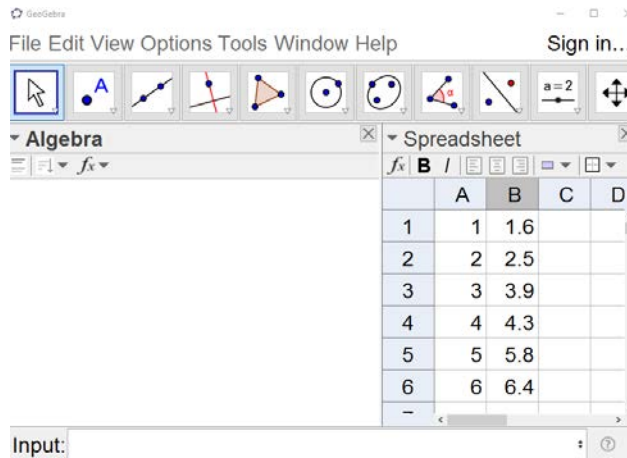
Step 3 and Step 4: Highlight these two columns and select the icon {1,2} at the top left area of the GGB window, click the bottom right corner of the icon and choose "Create List of Points".A window will appear with the default name "list1" for the list of points, rename it if you'd like. Then click "Create".
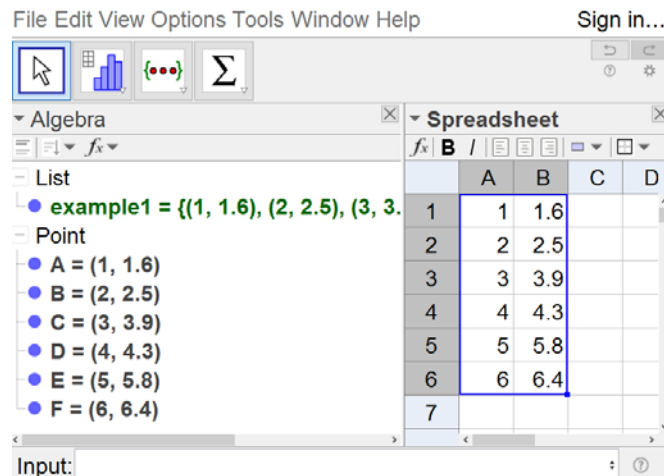
If you "View" the "Graphics" window, you'll see the points plotted.
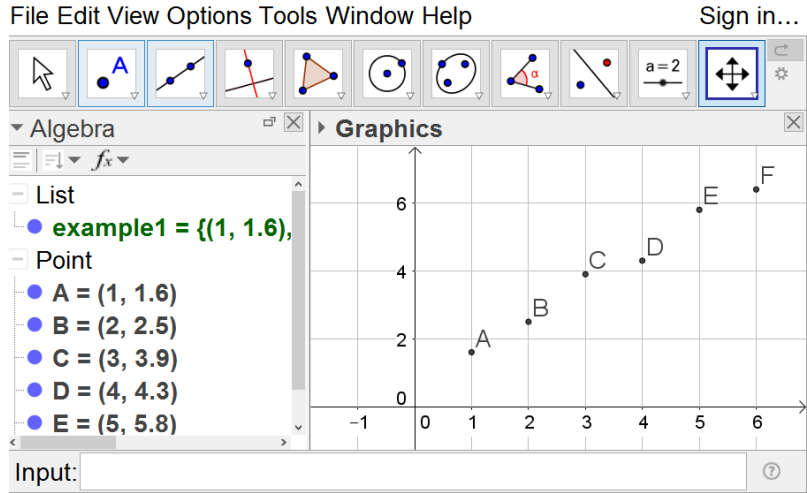
Linear regression model:
Command: Answer:

Quadratic regression model:
Command: Answer:

Exponential regression model:
Command: Answer:

Power regression model:
Command: Answer:

You will also be asked to find a value for regression models called r^2. This value measures the "goodness of fit" for a regression model, and will be between 0 and 1. The closer the value is to 1, the better the ***linear regression model*** predicts the trend of the given data. The closer it is to 0, the less useful it will be in predicting future values. For our purposes in this class, they will give us a piece of information for determining how well a regression equation fits the underlying data.

The command is "RSquare[<List of points>, <Function>].

Example 2: Use the data and the quadratic regression model that you found in Example 1 to find value r^2.

Command: Answer:

Example 3: Suppose that we know the revenues of a company each year since 2014. This information is given in the table below:

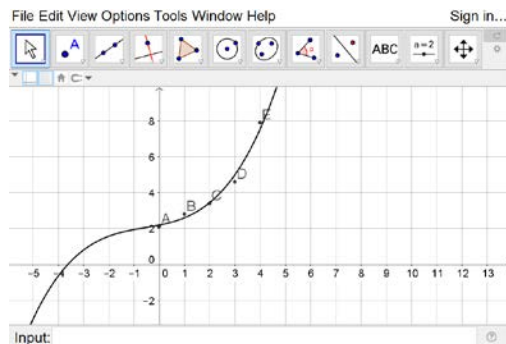| year	2014	2015	2016	2017	2018	2019
revenues (in millions of dollars)	2.1	2.8	3.4	4.6	7.9	11.2

Before starting this problem, rescale the data so that the year 2014 corresponds to $x = 0$.

Find the cubic and quartic regression models for the data.
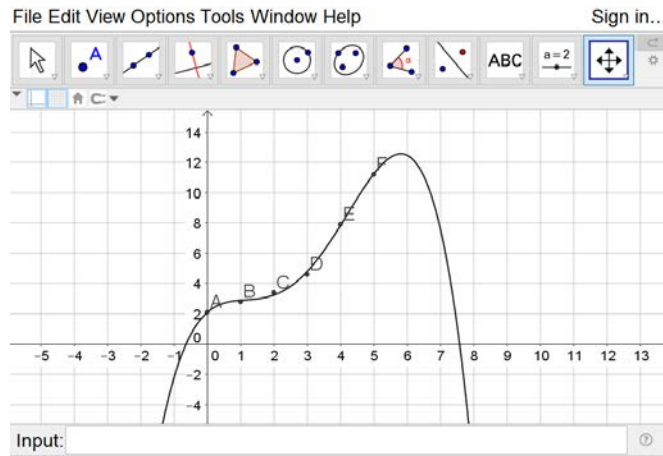
Cubic Model:
Command:

Answer:

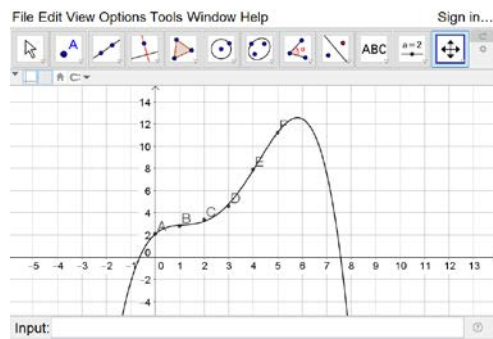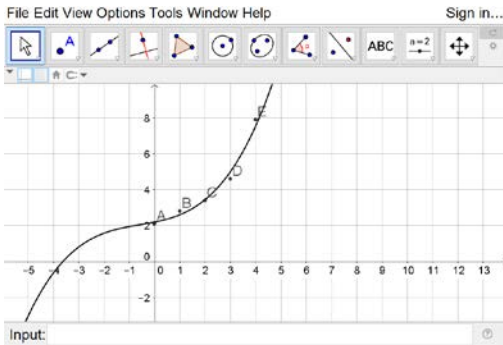*Quartic Model:*
Command:

Quartic Model:

c. Which model would be the best one to use? Why?

d. Use that model to predict revenues in 2022.
Command: Answer: