

MATH 1332 Instructions for Linear Project

In this project you will collect your own data and then fit two linear models to the data. The hand-done model will be the equation that you write between the specified 2 points. The calculator-done model will be the equation resulting from a regression on all of the data. The results of your work will be typed or written into the form provided in the Word document Form-LinearP.doc. You must type the desired answer in any of the gray boxes, paste your screenshots into the specified places, and then print your document and copy in the hand-done work in the spaces provided.

1. Collect and organize the data:

You have been given a piece of rope. You will need to measure (accurately -- don't just round to the nearest inch) the length of the rope at the start of the project. The tickmarks on your tape measure are sixteenths of an inch. Tie one knot and measure the length of the rope again. Repeat this step until your rope has 5 knots in it. Try to use consistent force when tightening the knots to measure the length. You will need to turn in your rope with the 5 knots still in it. Put your name on a piece of paper inside the sack.

Complete the table showing your data **on the computer** -- the number of knots will be the x-value and the length of the rope will be the y-value. Be sure to type headings for each column. Use mixed numbers in the table even though the calculator will change them into decimals. There should be 6 data points.

Complete the graph **by hand** to show your data points. Connect consecutive points with a line segment. Be sure to use an appropriate scale and to label your axes.

2. Calculate the slopes:

We will be using the calculator for this part and the next part. Simply follow the steps given below but use your data instead of mine. We will need to use the list and statistics capabilities of the calculator for these parts. Put your x-values in List 1 (L1) and your y-values in List 2 (L2). Use the arrow keys to move between lists. To type a mixed number in the calculator you will need to use addition between the whole number part and the fraction part. For example: $39 \frac{3}{4} = 39 + 1/4$

The calculator has a built in function that will subtract consecutive entries in a list. It is the "change in" or Δ List function. We will use this to calculate the slopes of the line segments joining consecutive points. The change in L2 is the change in the y-values and the change in L1 is the change in the x-values so if we divide these two quantities, we'll have the slopes. We will store these slopes in L3 so move your cursor to the **top** of L3 before entering the formula.

The screenshots illustrate the following steps:

- Press **STAT** to open the list editor.
- Enter data into **L1** (1, 2, 3, 4, 5) and **L2** (3.5, 3.75, 4.0, 4.25, 4.5).
- Press **2nd** then **LIST** to access list functions.
- Press **7** to select the change in list function.
- Press **2nd** then **L2** to select list 2.
- Press **)** to close the list name.
- Press **/** to divide.
- Press **2nd** then **L1** to select list 1.
- Press **)** to close the list name.
- Press **ENTER** to execute the formula.

You will need to make a screenshot showing all 3 lists and paste it into your Word document.

3. Model the problem:

Write the equation of the line passing through your first and last points. Do this **by hand** and copy your work neatly onto your finished document.

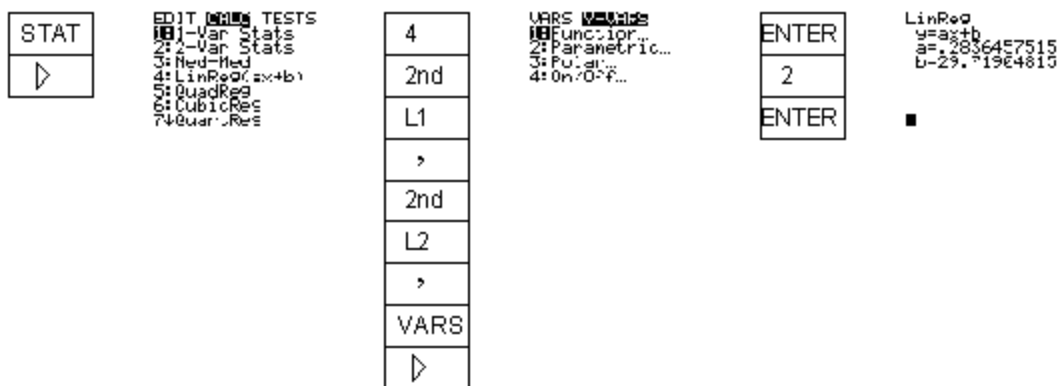
Enter the equation you found in your calculator and make a graph showing all 6 of your data points as well as this line. Choose an appropriate window for the graph.

To graph the 6 points follow the steps given below. Remember, that L1 contains your x-values and L2 contains your y-values.



You will need to make a screenshot of the Y='s screen with the equation in Y1 highlighted and a screenshot of this graph and paste them into your Word document. Be sure only the Y1 is highlighted.

Ask the calculator to write the equation of the line that best fits the data by following the steps below. Put this equation in Y2 and then plot all 6 points and this line.



Your equation will be in Y2 and you can graph it with the 6 points just like you did with the first line. You will need to make a screenshot of the Y='s screen with the equation in Y2 highlighted and a screenshot of this graph and paste them into your Word document. Be sure only the Y2 is highlighted.

4. Put it all together:

When you have all three lists filled and both equations stored in Y='s, it is time to get the copies of the screens. You may come by during my office hours and I can do this using my graph link. The Learning Center also has a graph link. They also have the virtual calculator that I use in class. You will need a disk or a jump drive as you will be saving these so that you can paste them into the final document. Summarize the results of this project by filling in all of the gray boxes in the Summary section. When you have completed all of the questions and pasted in all of the screen shots, print your document and copy in the hand-done work. The grading rubric on the first page of your Word document should be the cover page of your project. Use the rubric to check that you have completed all parts of this project. Staple all pages together. If you turn in the project by putting it under my office door, you may bring the rope to class on Wednesday.