

Linear Regression on a TI Calculator

In this section, you learned about the criterion that is used to determine what linear function passes closest to a set of data. In this handout, you'll learn how to use a Texas Instruments graphing calculator to find the least squares linear model. You'll start by preparing entering the data in the table below into your calculator and then use the LinReg command to carry out linear regression.

Weekly Demand for Milk (thousands of gallons)	85	95	105	115	125
Average Price Per Gallon (dollars)	3.89	2.78	3.01	3.23	1.69

1. Start by turning on your graphing calculator. Press **[ON]**. If you see anything on the home screen, press **[CLEAR]** to clear the screen.
2. To insure your calculator gives all the information we need when carrying out linear regression, we need to insure that it is set up properly. These steps only need to be carried out after changing the calculator's batteries or when it is brand new. Press **[2nd][0]** to access the calculator's catalog of commands.



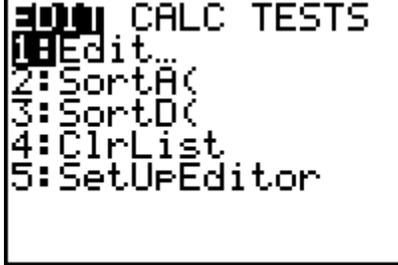
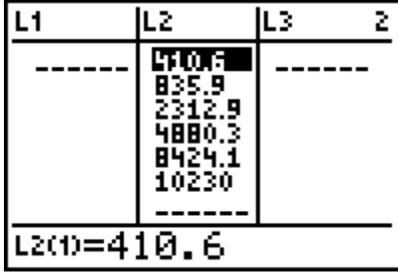
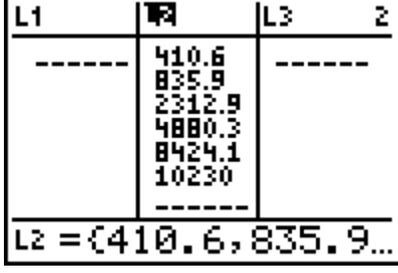
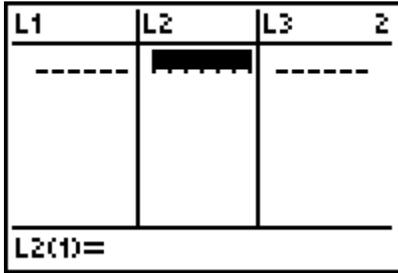
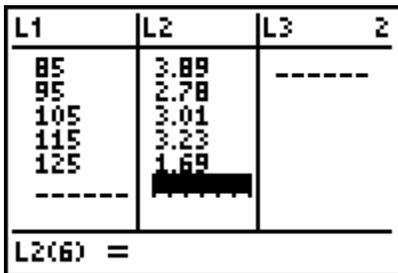
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3. Use the **▼** button to locate the command DiagnosticsOn.
4. Press **[ENTER]** to paste the command to the homescreen.
5. Press **[ENTER]** to execute the command.



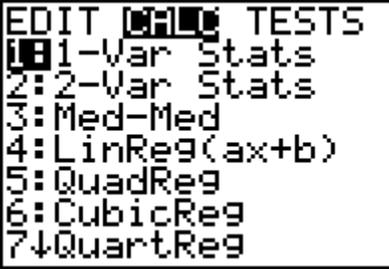
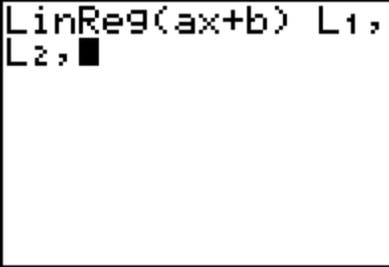
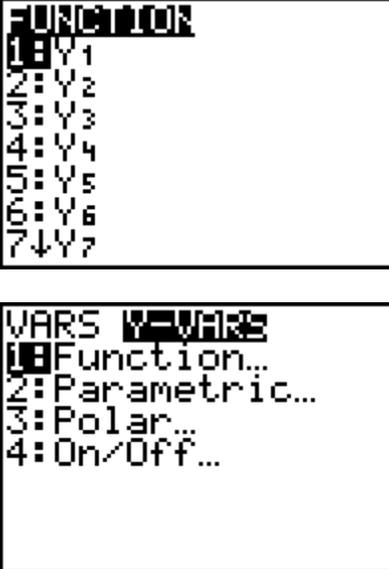
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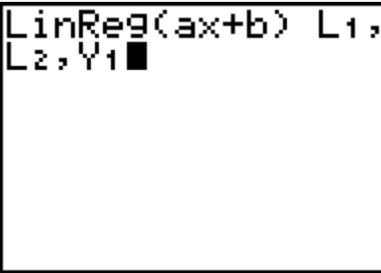
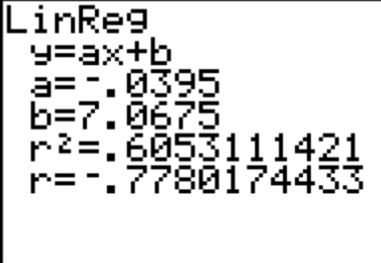
<p>6. Now that the calculator is set up properly, we need to enter the data into the calculator. Data is stored in the statistics list. Press [STAT] to access the statistics commands.</p>	
<p>7. Press [1] or [ENTER] to enter the statistics editor. In the screenshot to the right, there is already some data in the list 2 column named L2. Since we are going to put the columns of data into columns L1 and L2, we need to erase the data you see here.</p>	
<p>8. If your two columns are empty, skip to step 10. Use the [▲] button to move the cursor to the top of the column.</p>	
<p>9. To erase the contents of the column, press [CLEAR] followed by [CLEAR]. You can clear other column by moving to the top of other columns and repeating this step.</p>	
<p>10. Enter each of the quantities from Error! Reference source not found. in column L1. You may need to move within the editor using the arrow keys [←], [→], [▲], or [▼].</p> <p>11. Enter each of the prices from Error! Reference source not found. into column L2.</p>	

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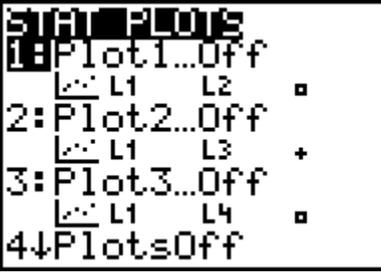
<p>12. Now that the data in the statistics editor in lists L1 and L2, we can compute the linear model. Press [STAT] again.</p> <p>13. Press [▶] to move to the CALC menu.</p>	
<p>14. Linear regression is carried out by pressing [4]. This pastes the command $\text{LinReg}(ax + b)$ to the home screen.</p> <p>15. To tell this command where the data is press [2nd][1][,][2nd][2][.]. This types L1 and L2 separated by a comma after the command. Since we plan to graph this model with the data, we'll add one more piece of information to the LinReg command. We'll type the location in the equation editor where the model will be pasted.</p>	
<p>16. Press [VARS].</p> <p>17. Press [▶] to move to the Y-VARS menu.</p> <p>18. Press [1] to select Function.</p> <p>19. Press [1] to select Y_1.</p>	

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<p>20. Press ENTER to carry out linear regression on the data in lists L1 and L2 and to paste the model into the equation editor as Y₁. The model displayed here is the same as the model examined earlier.</p>	

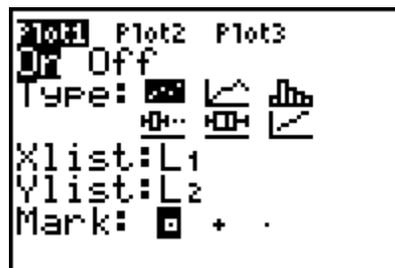
The values for r^2 and r should be displayed as long as you carried out steps 2 through 5. We'll examine these numbers in Objective 4.

Once the model has been computed, you should carry out the following steps to view a scatter plot of the data and the corresponding linear model.

<p>21. Before we can make a scatter plot, we need to turn on the scatter plot. Press 2ndY= to access the STAT PLOT menu. This menu shows three available plots and their current status. For instance, Plot 1 is shown as off and is set to graph a scatter plot from the data in list L1 and L2.</p>	
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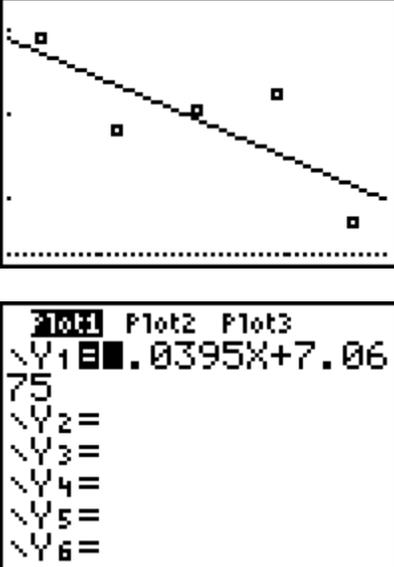
22. Press **[1]** to change the characteristics of Plot 1. Highlight On and press **[ENTER]** to turn Plot 1 on.
23. Use **[↓]** to move to the line starting with Type. The Type refers to the type of graph. Make sure the first type is highlighted. This indicates that you want to make a scatter plot. If it is not highlighted as shown to the right, highlight the first type and press **[ENTER]**.
24. Use **[↓]** to move to the line labeled Xlist. Xlist indicates the location of the data plotted horizontally. Press **[2nd][1]** to put L1 next to Xlist.
25. Use **[↓]** to move to the line labeled Ylist. Ylist indicates the location of the data plotted vertically. Press **[2nd][2]** to put L2 next to Ylist.
26. Use **[↓]** to move to the line labeled Mark. Pick a mark and highlight it by pressing **[ENTER]**. This is the mark that will be used to plot the points in the scatter plot.



27. We could set the window by pressing **[WINDOW]**, but for this graph we'll use a shortcut. Press **[ZOOM]** to view the Zoom menu. Press **[9]**. You could also use **[↑]** or **[↓]** to locate ZoomStat and press **[ENTER]**. This command automatically changes the window so that all of the data in lists L1 and L2 are



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viewable in the scatter plot.													
28. The plot of the data is created. The linear model is also shown since we placed the model's formula in Y_1 . You can view that formula by pressing $\boxed{Y=}$.	 <p>The image shows two screenshots from a TI calculator. The top screenshot is a scatter plot with a linear regression line. The bottom screenshot is the data list editor showing the regression equation $Y_1 = .0395X + 7.06$.</p> <table border="1"><caption>Data points from the scatter plot</caption><thead><tr><th>X</th><th>Y</th></tr></thead><tbody><tr><td>1</td><td>10</td></tr><tr><td>2</td><td>5</td></tr><tr><td>3</td><td>6</td></tr><tr><td>4</td><td>8</td></tr><tr><td>5</td><td>2</td></tr></tbody></table>	X	Y	1	10	2	5	3	6	4	8	5	2
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1	10												
2	5												
3	6												
4	8												
5	2												