

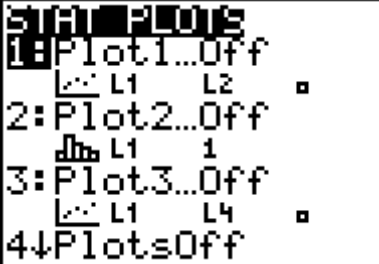
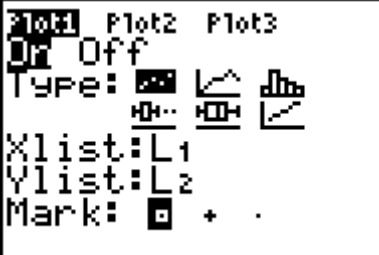
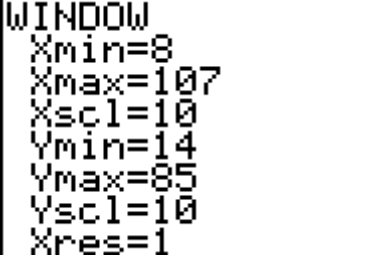
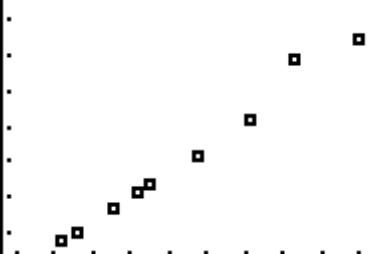
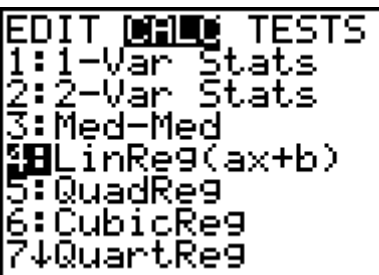
There are many types of regression models that we can use to model data. This document demonstrates how to find a linear model for approximately linear data using a graphing calculator. In this example, the independent variable x represents the earning for males and the dependent variable y represents earnings for females. Follow the steps below to find a linear model $y = mx + b$ for the data in the table.

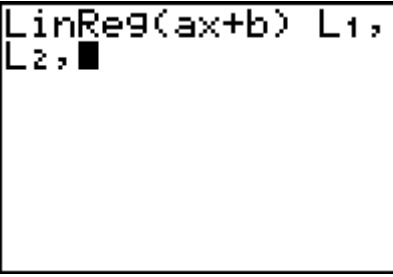
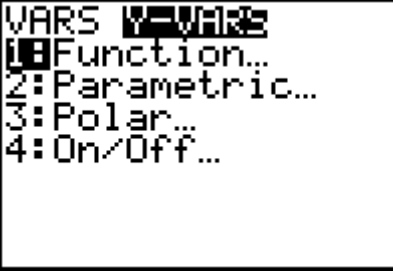
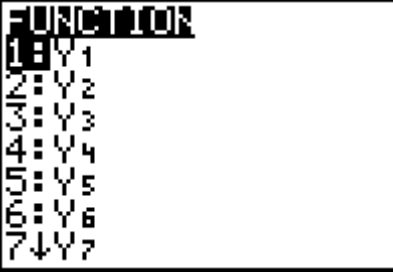
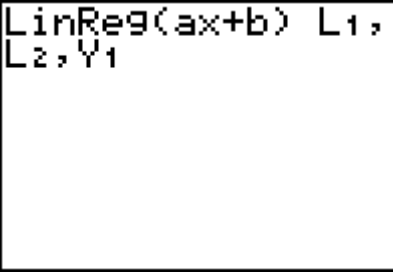
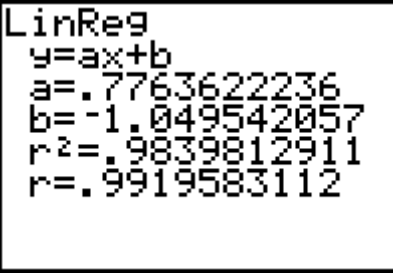
Educational Attainment	Average Annual Earning for Males (\$ thousand)	Average Annual Earning for Females (\$ thousand)
Less than ninth grade	21.659	17.659
Some high school	26.277	19.162
High school graduate	35.725	26.029
Some college	41.875	30.816
Associate's degree	44.404	33.481
Bachelor's degree	57.220	41.681
Master's degree	71.530	51.316
Doctorate degree	82.401	68.875
Professional degree	100.000	75.036

Enter the data

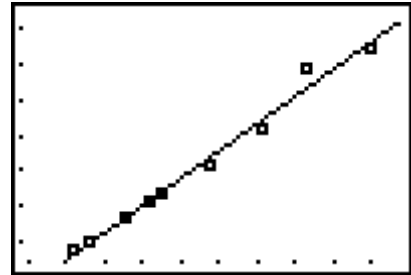
- To enter the data, press **[STAT]**.
- Press **[ENTER]** to select 1: Edit...
- If there is already data in the L1 and L2 lists, move your cursor to the name of the list and press **[CLEAR][ENTER]**. This should remove the contents of the list. Enter the male earning in the L₁ list and female earnings in the L₂ list.

L1	L2	L3	Z
41.875	30.816		
44.404	33.481		
57.22	41.681		
71.53	51.316		
82.401	68.875		
100	75.036		
-----	*****		
L2(10) =			

<p>4. Press 2nd Y= to format Plot 1. Select 1: Plot 1 and press ENTER.</p>	 <pre> STAT PLOTS 1: Plot1...Off L1 L2 2: Plot2...Off L1 1 3: Plot3...Off L1 L4 4↓ PlotsOff </pre>
<p>5. Make sure the plot is turned on and that the data is coming from L1 and L2. Make any changes so that the screen looks like the one to the right.</p>	 <pre> Plot1 Plot2 Plot3 Off Off Off Type: [] [] [] [] [] [] Xlist:L1 Ylist:L2 Mark: [] + . </pre>
<p>6. Press WINDOW and adjust the window to the values shown to the right.</p>	 <pre> WINDOW Xmin=8 Xmax=107 Xscl=10 Ymin=14 Ymax=85 Yscl=10 Xres=1 </pre>
<p>7. Press GRAPH to see the scatter plot.</p>	
<p>Find the linear model</p> <p>8. The command to find the least squares line is located under the CALC menu when you press STAT.</p> <p>9. Press 4 or highlight 4: LinReg(ax+b). This will paste the linear regression command to the home screen.</p>	 <pre> EDIT [] TESTS 1:1-Var Stats 2:2-Var Stats 3:Med-Med 4: LinReg(ax+b) 5:QuadReg 6:CubicReg 7↓QuartReg </pre>

<p>10. The linear regression command needs to be followed by the source of the data. Press $\text{2nd}[1], \text{2nd}[2]$. This indicates that linear regression will be carried out with the x values from L_1 and the y values from L_2.</p>	
<p>11. To paste the resulting model into Y_1, we need to paste it after the sources of the data. Press VAR.</p> <p>12. Use right arrow to move to the Y-Vars menu.</p> <p>13. Press $[1]$ or highlight 4: Function... and press ENTER.</p>	
<p>14. To paste Y_1 to the home screen, press $[1]$ or highlight 1: Y_1 and press ENTER.</p>	
<p>15. The complete linear regression command should look like what you see to the right. Press ENTER to carry out the linear regression.</p>	
<p>16. You'll see the equation of the line. In this case, the equation is $y = .7763622236x - 1.049542057$. Below the model is the value of the correlation coefficient r. If you do not see the correlation coefficient, follow step 18 to force your calculator to display the correlation coefficient.</p>	

17. Press **GRAPH** to see the scatter plot with the corresponding linear model.



18. To insure your calculator displays the correlation coefficient, press **2nd|0** to access the calculator's catalog of commands. Scroll down to the entry **DiagnosticOn**. Press **ENTER** to paste the command to the home screen. Press **ENTER** again to execute the **DiagnosticOn** command. The next time you carry out the **LinReg(ax+b)** command, the correlation coefficient will be displayed.

