

## Using The TI-83 for Linear Regression

You can use the TI-83 calculator to determine the correlation between two variables, calculate and graph the linear regression equation, and use the equation to predict y-values.

Important: Before starting a regression problem, press 2<sup>nd</sup> CATALOG (above 0) and scroll down to the entry DiagnosticOn. Press ENTER twice. After doing this, the correlation coefficient  $r$  will appear with the linear regression equation. You only have to do this one time, unless you turn the diagnostics off.

CATALOG ▶abs( and angle( ANOVA( Ans Archive Asm( 	CATALOG DependAsk DependAuto det( DiagnosticOff ▶DiagnosticOn dim( Disp 	DiagnosticOn <span style="float: right;">Done</span> 
---	--	---

### Example

Let's look at our latitude and temperature example from class. To determine the correlation between two variables, enter the x-values (north latitude) in L<sub>1</sub> and y-values (April temperature) in L<sub>2</sub>.

L1	L2	L3	3
6.0000	89.000	██████	
18.000	84.000		
23.000	97.000		
30.000	83.000		
35.000	63.000		
42.000	68.000		
47.000	46.000		
L3(1)=			

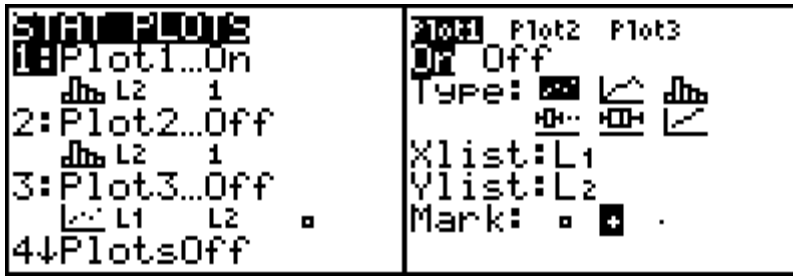
Hit STAT and arrow over to the CALC menu and then down to 4:LinReg(ax+b) and press ENTER so that command comes up on your screen. Enter L<sub>1</sub>, L<sub>2</sub> to show which two lists you want to correlate. When you hit ENTER the results are displayed (last screen):

EDIT <span style="font-size: small;">(ON)</span> TESTS 1:1-Var Stats 2:2-Var Stats 3:Med-Med 4:LinReg(ax+b) 5:QuadReg 6:CubicReg 7↓QuartReg 	LinReg(ax+b) L1, L2 	LinReg y=ax+b a=-.9830 b=104.1780 r <sup>2</sup> =.8023 r=-.8957 
--	----------------------------	---

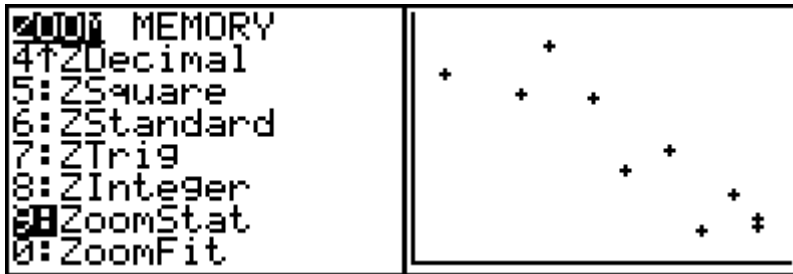
From the third screen above, you see that the linear regression equation is  $\hat{y} = -0.9830x + 104.1780$ .

We also have the value of the correlation coefficient ( $r = -.8957$ ) and the value of the coefficient of determination ( $r^2 = .8023$ ).

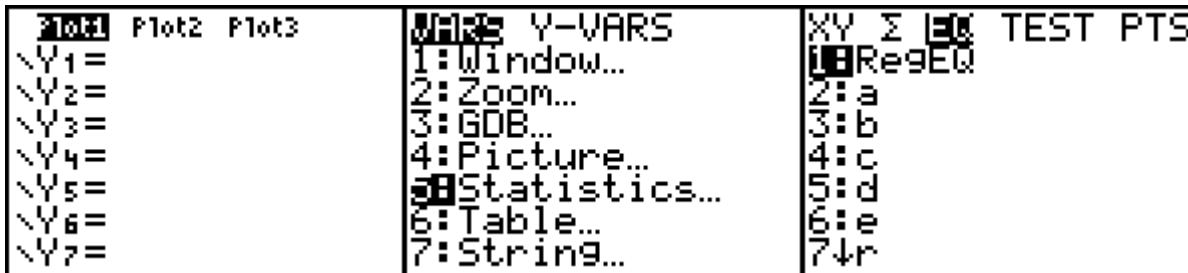
To construct a scatter plot of the points, press 2<sup>nd</sup> STAT PLOT (above Y=). Highlight 1:Plot1 and press ENTER. Then on the next screen select On (put cursor on On and hit ENTER) and the scatter plot (first graph on the first row). Set Xlist to L<sub>1</sub> and set Ylist to L<sub>2</sub>. Set your mark for each point by selecting a box, cross, or dot.



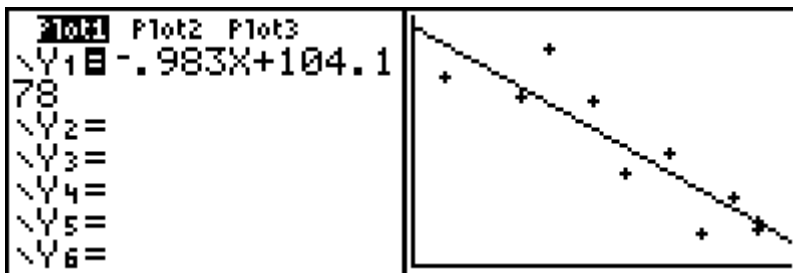
Next press ZOOM 9 (ZoomStat) to set the graphing window and see the scatter plot. You can also use the WINDOW button to set your window, but ZOOM 9 is easier.



To paste the regression equation in the graph, press Y= in the upper left hand corner. Clear out any previous equations and press VARS, go to 5:Statistics, then to EQ, and then to 1:RegEQ (regression equation) as shown below.



Next press ENTER and the regression equation is pasted in Y=. Press GRAPH and see the scatter plot with the regression equation.



To predict y-values, press 2<sup>nd</sup> CALC (above the TRACE key) and select 1:value and press ENTER. This will allow you to enter a value for x and find its predicted y-value. To predict the April temperature for Columbus, Ohio (x =40), type 40 and press ENTER. A cursor will appear and you will see that Y=64.858 or 64.858 degrees.

