TI83/84 Correlation: LinRegTTest

You can use the TI-83/84 calculator to determine the correlation between two variables, conduct hypothesis tests for a population correlation coefficient, calculate and graph the linear regression equation, and use the equation to predict y-values.

Turn Diagnostics On:

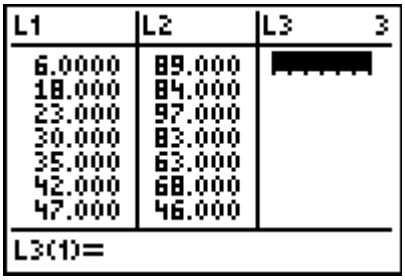
Before starting a regression problem, press 2nd 0 (for Catalog) and scroll down to the entry **DiagnosticOn**. Press ENTER twice. (In newer calculators, you can turn the Diagnostics on and off from the MODE menu.) After doing this, the correlation coefficient r will appear with the linear regression equation. You only have to do this one time, unless you turn the diagnostics off.

Find the regression equation, r, and r^2 and conduct a hypothesis test to determine if there is linear correlation:

Example: Let's look at degrees north latitude vs. April air temperature. Use the data below to find the regression equation, r, r^2, and to test for a linear relationship at the 10% level of significance:

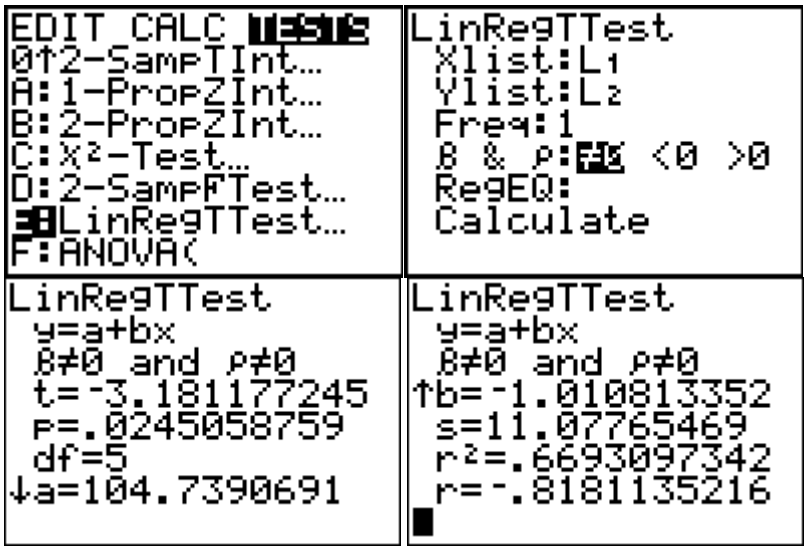
Procedure:

- Enter the x-values (north latitude) in L_1 and y-values (April temperature) in L_2:



- Press STAT and arrow over to the **TESTS** menu
- Select **E:LinRegTTest** by highlighting the E and pressing ENTER or by typing E
- In the form that comes up enter the list name (L_1) that contains your independent variable in **Xlist:** and the list name (L_2) that contains your dependent variable in **Ylist:**
- Make sure that **Freq:** is set to 1
- Select the appropriate alternative hypothesis based on your problem statement by highlighting $\neq 0$, < 0, or > 0 and pressing ENTER

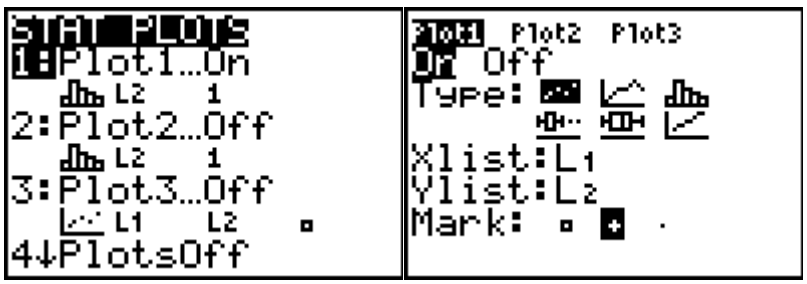
- Leave **RegEQ:** blank, or enter the **Y-VARS** location where you want to store the regression equation (for more, see below)
- Highlight **Calculate** and press ENTER to display the results:



You can now complete your hypothesis test either by comparing the test statistic (t) to critical values or by comparing the P-value to the αlevel given in the problem. In this case, since the P-value is less than the significance level given in the problem ($.10$) we reject H_o and can say that at the 10% level of signifigance there is enough evidence to say that there is a realationship between north latitude and April air temperature. We also know that this relationship is a negative one based on the sign of both b and r. This tells us that as we move further north the April temperature decreases.

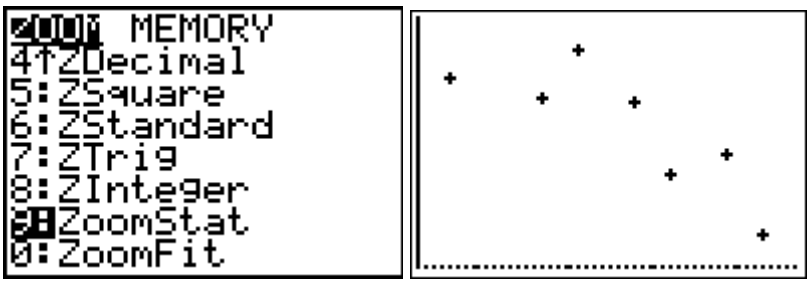
Construct a scatter plot of the points:

- Press 2nd Y= for **STATPLOT**
- Highlight **1:Plot1** and press ENTER
- Select **On** (put cursor on On and press ENTER) and the scatter plot (first graph on the first row)
- Set **Xlist** to L_1 and set **Ylist** to L_2.
- Set your mark for each point by selecting a box, cross, or dot:



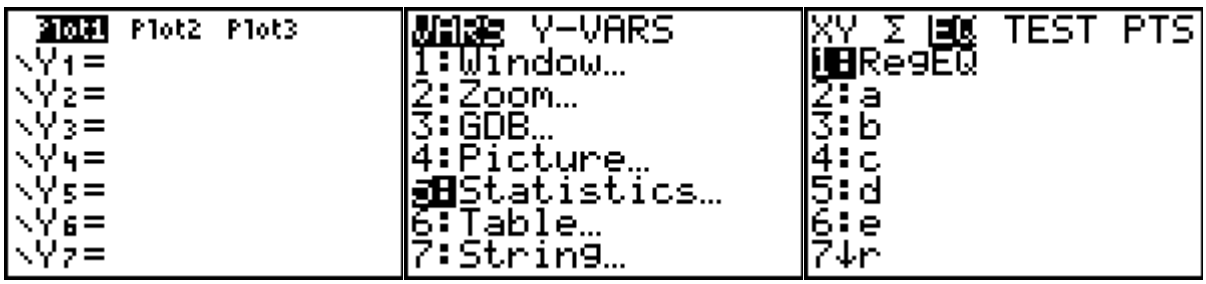
- Next press ZOOM and select **9:ZoomStat** to set the graphing window and see the scatter plot

- You can also use the WINDOW button to set your window, but ZOOM 9 is easier:

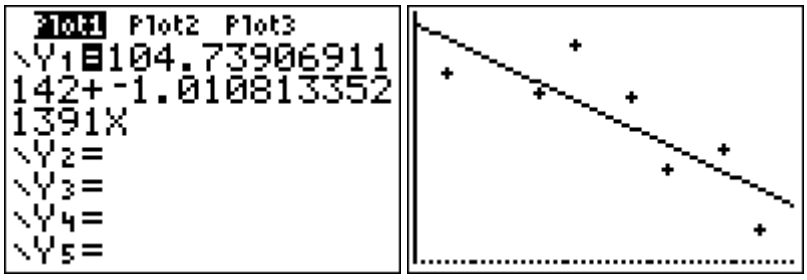


Overlay the regression equation on the scatter plot:

- 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** and press ENTER
- Use the arrow keys to highlight **EQ** (for "equation") and then select **1:RegEQ** (regression equation) and press ENTER:



- The regression equation is pasted in Y=
- Press GRAPH and see the scatter plot with the regression equation:



Predict y-values:

- Press 2nd TRACE (for **CALC**)

- Highlight **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. This will predict the mean of the observations at this point (there is more to do by hand to obtain the prediction interval).