CREATING SCATTERPLOTS AND REGRESSION EQUATIONS ON A TI 83/84

How do I get to the Stat Editor?

Press STAT and then press ENTER.
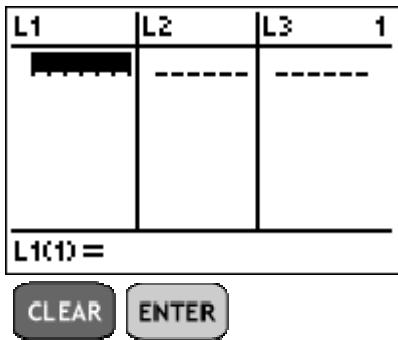

How do I clear a list in my Stat Editor?

If you want to erase all the entries in a list, such as L_1 below, use the arrow keys to scroll to the top of the list, press CLEAR, and then press ENTER.

How do I enter numbers in the lists?

Just hit the key for that number and press ENTER. When you have populated one list, use the arrow keys to go to the next list. Also, for most operations and calculations, L_1 and L_2 are the default lists for input and output values.
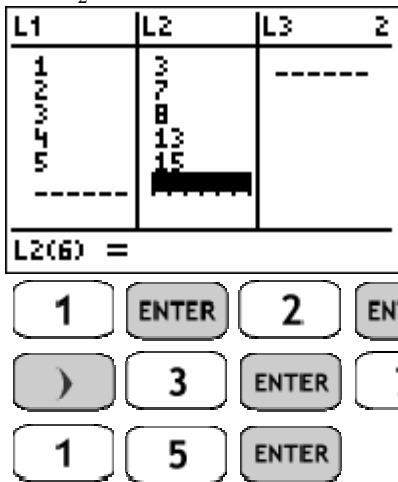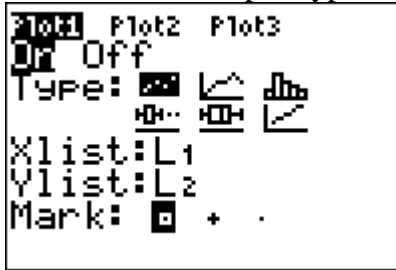

How do I activate a Stat Plot?

Press 2nd, Y=, ENTER to select Plot1.

Next, use the arrow keys to navigate through the list, and make sure that ON is selected as well as the first plot type, L_1, and L_2.

```
Plot1  Plot2  Plot3
On  Off
Type:
Xlist:L1
Ylist:L2
Mark:  □  +  .
```
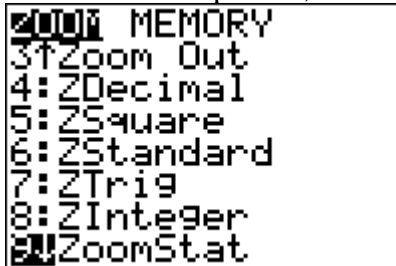
ENTER

How do I graph my scatterplot?

First, press Y= to make sure that there are no superfluous functions in your graph editor that might interfere with the viewing of your scatterplot. If there are any functions you want to get rid of, use he arrow keys to scroll to the function and press CLEAR. Also, notice that Plot1 is highlighted at the top. This is verification that Plot1 has been activated. You can also either activate or deactivate Plot1 by using the arrow keys to scroll to the top and pressing ENTER.

```
Plot1  Plot2  Plot3
\Y1=
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```

Y=
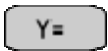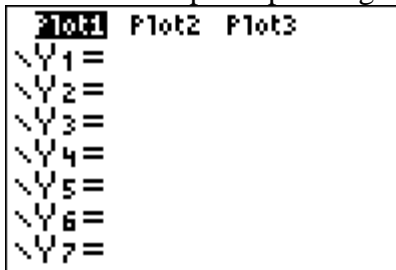
Once you've eliminated all unnecessary functions in the graph editor, press ZOOM and scroll down to option 9, ZoomStat.

```
ZOOM  MEMORY
3:Zoom Out
4:ZDecimal
5:ZSquare
6:ZStandard
7:ZTrig
8:ZInteger
9:ZoomStat
```

Now press ENTER, and ZoomStat will automatically adjust the viewing window so that all the plot points can be seen.
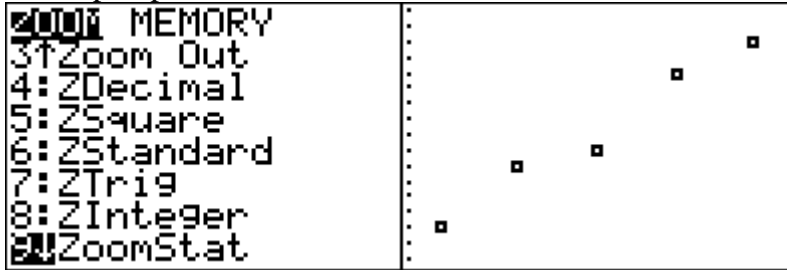
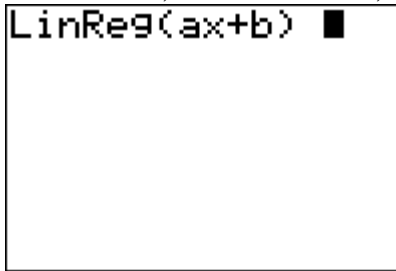

ENTER

How do I do a linear regression?
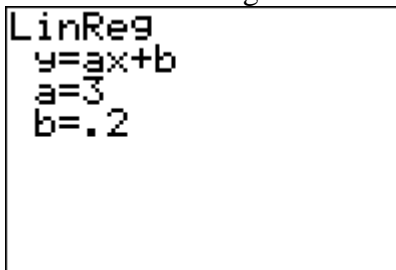
Press STAT, scroll to CALC, scroll down to option 4, LinReg (ax+b), and hit ENTER.

```
LinReg(ax+b) ■
```

STAT) ⌄ ⌄ ⌄ ENTER

Now hit ENTER again to obtain the regression equation.

```
LinReg
 y=ax+b
 a=3
 b=.2
```

ENTER

What do I do if I don't see the values for r or r^2 on the screen?

First, press 2nd, 0 to open the catalog.

```
CATALOG        ▣
▶abs(
  and
  angle(
  ANOVA(
  Ans
  Archive
  Asm(
```

[2nd] [0]

Scroll down to DiagnosticOn and press ENTER twice.

```
CATALOG        ▣   a=3
  Degree             b=.2
  DelVar
  DependAsk
  DependAuto
  det(               DiagnosticOn
  DiagnosticOff                Done
▶DiagnosticOn      ■
```

[⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄]

[⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄]

[⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄]

[⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄]

[⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄] [⌄]

[⌄] [ENTER] [ENTER]

Now repeat the procedure for doing a linear regression, and the diagnostics will appear.

```
LinReg
  y=ax+b
  a=3
  b=.2
  r²=.9698275862
  r=.9847982464

■
```

[STAT] [ )] [⌄] [⌄] [⌄] [ENTER] [ENTER]

How do I interpret r and r^2?

The number r is known as the coefficient of correlation. Its value is always between -1 and 1. The closer r is to -1 or 1, the better the regression curve fits the data, and the closer r is to zero, the worse the fit. Furthermore, for a linear regression, if r is positive, then the y values tend to increase as x increases, and if r is negative, then y tends to decrease as x increases. In other words, the linear regression line will rise from left to fight if r is positive and fall if r is negative. In this regard, r positive or negative is similar to having slope negative or positive, but that is as far as the analogy goes. In particular, r tells us how good the fit of the line is to the data and not how steep the line is, such as the slope does.

For most of the curve fitting procedures on the TI-83/84 calculator, we also get back the value of r^2. This is particularly easy to interpret for both linear and non-linear regressions. If r^2 is close to 1, the curve is a great fit for the data, and if r^2 is close to zero, then it's a horrible fit. It's just that simple!

```
LinReg
 y=ax+b
 a=3
 b=.2
 r²=.9698275862
 r=.9847982464

■
```

STAT ❭ 4 ENTER
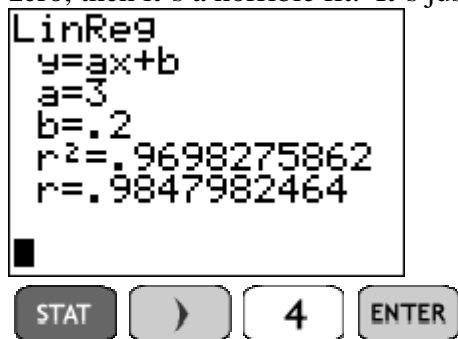
How can I automatically paste my regression equation into my graph editor?

Begin by pressing STAT, go to the CALC menu, select LinReg (ax+b), and press ENTER.

```
LinReg(ax+b) ■
```

STAT   )   ⌄   ⌄   ⌄   ENTER

Now press VARS.

```
VARS  Y-VARS
1:Window…
2:Zoom…
3:GDB…
4:Picture…
5:Statistics…
6:Table…
7:String…
```

VARS

Scroll to Y-VARS.

```
VARS  Y-VARS
1:Function…
2:Parametric…
3:Polar…
4:On/Off…
```

)

Hit ENTER to select Function.

```
FUNCTION
1:Y1
2:Y2
3:Y3
4:Y4
5:Y5
6:Y6
7↓Y7
```
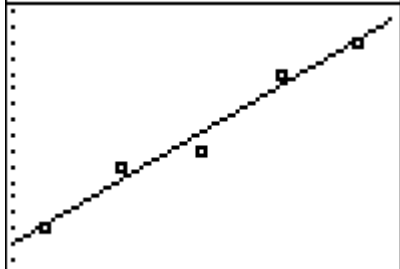
ENTER

And hit ENTER again to select *Y₁*.

```
LinReg(ax+b) Y₁
```

[ENTER]

If you hit ENTER again, then your calculator will now automatically paste the regression equation into your graph editor as *Y₁*. You can view this if you hit Y=. And when you press GRAPH, the graph of the regression function will appear along with your scatterplot.

```
LinReg
 y=ax+b
 a=3
 b=.2
 r²=.9698275862
 r=.9847982464
```

```
Plot1 Plot2 Plot3
\Y₁■3X+.2
\Y₂=
\Y₃=
\Y₄=
\Y₅=
\Y₆=
\Y₇=
```

[ENTER] [Y=] [GRAPH]

What do I do if I've accidentally deleted a list?

If some of the usual lists appear to be missing, then go to STAT, select SetUpEditor, and hit ENTER. This will restore everything to the defaults.

```
L1      L3     L5      3 | EDIT  CALC TESTS
 1                        | 1:Edit…
 2      ------  ------   | 2:SortA(
 3                        | 3:SortD(
 4                        | 4:ClrList
 5                        | 5:SetUpEditor
 ------
L5 =
```

```
SetUpEditor ■        | SetUpEditor
                     |              Done
```

```
EDIT  CALC TESTS     | L1      L2     L3      1
1:Edit…              |  1       3
2:SortA(             |  2       7     ------
3:SortD(             |  3       8
4:ClrList            |  4
5:SetUpEditor        |  5      ------
                     |  ------
                     | L1(1)=1
```
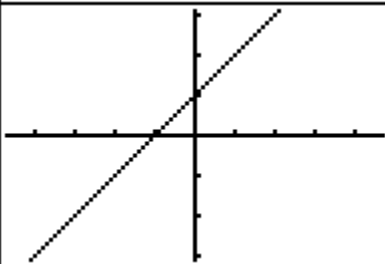
[STAT] [5] [ENTER] [STAT] [ENTER]

What do I do if it says DIM MISMATCH on my calculator screen?

This usually happens when you have left a Stat Plot on, tried to graph a function, and your lists have different numbers of elements in them.

To fix the problem, first press Y=. At this point you should see either Plot1, Plot2, or Plot3 highlighted at the top. Use your arrow keys to scroll to whichever one is highlighted and hit ENTER to turn it off. You should now be able to continue graphing your function without any difficulty.

What other kinds of regressions can I do to find mathematical models for scatterplots?

The CALC menu that you access by first pressing STAT contains procedures for a variety of mathematical regressions. Most of these also return either an *r* or r^2 value which helps you determine how well the model fits the data. For r^2, the closer the value is to 1, the better the fit, and the closer it is to 0, the worse the fit is to the existing data.

The regression procedures we'll use most often are:

LinReg (ax+b)   Finds the linear function that best fits the data, $y = ax + b$.

QuadReg   Finds the best fitting quadratic function, $y = ax^2 + bx + c$.

CubicReg   Finds the best fitting cubic polynomial function,
                     $y = ax^3 + bx^2 + cx + d$.

QuartReg   Finds the best fitting fourth degree polynomial function,
                     $y = ax^4 + bx^3 + cx^2 + dx + e$.

LnReg   Finds the best fitting logarithmic function, $y = a + b \ln x$.

ExpReg   Finds the best fitting exponential function, $y = ab^x$.

PwrReg   Finds the best fitting power function, $y = ax^b$.

Logistic   Finds the best fitting logistic function, $y = \dfrac{c}{1 + ae^{-bx}}$.