

**STATISTICAL CONCEPTS**  
**TI-83 or TI-84 CALCULATOR GUIDE**

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## General Information:

### *The meaning of the arrow (→):*

Throughout this document I will use the arrow above to indicate that keys should be pushed sequentially.

### *Darkening or lightening the Screen:*

You can darken (or lighten) your calculator's screen by pressing the  $2^{\text{nd}}$  → **Up arrow** (Down arrow) key. Repeat the process several times ( $2^{\text{nd}}$  → **Up** →  $2^{\text{nd}}$  → **Up** . . .) until the screen is easy to read.

### *Re-Entering a computation:*

#### *Deleting and Inserting:*

If you enter a formula or computation and need that same formula again (maybe, with some slight changes) you can "recall" the formula by pressing  $2^{\text{nd}}$  → **Enter**. Pressing  $2^{\text{nd}}$  → **Enter** again will bring up the entry prior to that. The calculator remembers about the last 6 or 8 entries.

Once the formula is back on the screen you can delete parts of it by using the delete (**DEL**) key. You can also insert information into the formula by using the insert (**INS**) (that is  $2^{\text{nd}}$  → **DEL**) key. If you just type the new parts into the formula, it will "overwrite" what is there.

## Module 1; Section 1

### *RANDOM NUMBER:*

One way to choose a number at random is the random number generator on your calculator. To get to the random number press **MATH** → **PRB** → **1:rand** → **ENTER**. (See "Random number" under the calculator topics for a more thorough explanation.)

Here is an example of the screen before the ENTER was pushed.

```
MATH NUM CPX 1235
1:rand
2:nPr
3:nCr
4:!
5:randInt(
6:randNorm(
7:randBin(
```

Pressing ENTER → ENTER will bring the random generator to the Home Screen and pressing it over again and again will generate a series of random numbers. Your numbers will be different from those on this screen (that is what makes them random). Random numbers less than a specific value can be generated by entering that number after the word “rand”

```
rand
.6378300799
```

```
rand8385
5849.889604
127.2726938
853.7872148
6637.790733
3092.709183
4250.451379
```

Here, number 5849 was chosen followed by number 127, then number 853, number 6637, etc.

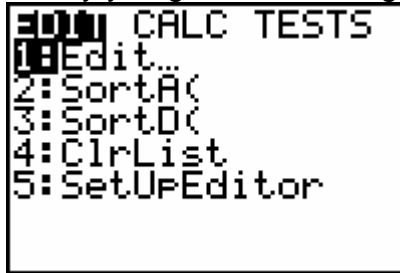
Suppose that you want random numbers between 0001 and 8,384. The calculator can choose those for you. Get the **rand** command and type in 8385 (one more than your highest number you want generated) and then press enter. The calculator will generate only random numbers below that value. You will need to truncate the number so it is an integer.

## Module 1; Section 2

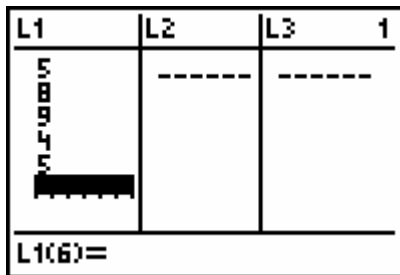
### Entering Data into a List:

### Clearing Data out of a List:

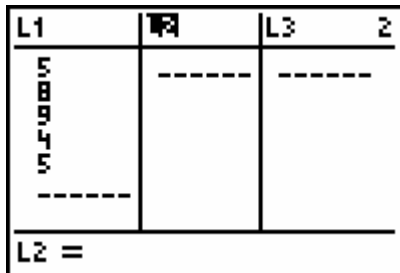
There are two easy ways to enter data into a list in your calculator. The first is **STAT** → **EDIT** → **ENTER** and then to type your data into the list. When you press the **STAT** key you get the following screen:



From here you can choose **EDIT** either by choosing a 1 from the keyboard or by pressing the **ENTER** key (since the 1 is already highlighted). In the picture below the numbers 5,8,9,4 and 5 have been entered into the first list. You may choose any one of six lists. (Use your arrow keys to display the lists L4, L5 and L6. The small 1 in the upper right corner indicates that your cursor is in the first list.



The second way to enter data into a list is to use the data which is already in a list. Suppose you want to make L2 equal to twice the value of the number in list one plus 6. Put your cursor on top of the name of the list , L2, as shown in the picture below



Notice that the last line is ready to define the whole L2. You want to multiply list one by two, add six to the result and put the results in list 2. To do so you type **2** → **x** (the times sign) → **L1** → **+** → **6** → **ENTER**. You should get the screen below. (The L1 in this expression can be typed by **2<sup>nd</sup>** → **1**, that is the yellow key followed by the number 1 key)

L1	L2	L3	Z
5	17	-----	
8	22		
9	24		
4	14		
5	16		
-----	-----		
L2(1)=16			

To clear the numbers out of a list you can key in **STAT** → **4:ClrList** → **ENTER** followed by the name of the list you want cleared and another **ENTER**.

A second way (and easier) to clear a list is to position the cursor over the top of the name (like L3) of the list you want to clear. Then press **CLEAR** → **ENTER** and the list will clear.

**WARNING:** Do not **DELETE** the list as the whole list, including the name, will vanish.

Your data will remain in your calculator until you decide to delete it.

### **Statistical Graphs:**

#### **Histogram:**

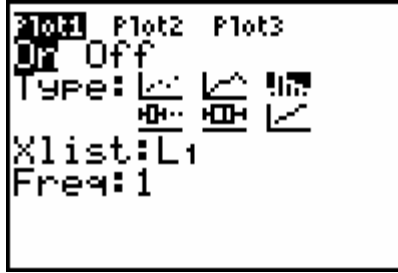
First clear the **Y=** menu. (For now, press the **Y=** key and Delete anything that is there.) **2<sup>nd</sup>** → **QUIT** to get back to the home screen.

To create a histogram you first must have data in a list. Put the following data in list 1 (L1) following the steps above:

2, 3, 3, 4, 3.5, 5, 5, 2, 4, 3, 6, 5, 5, 4, 7, 2

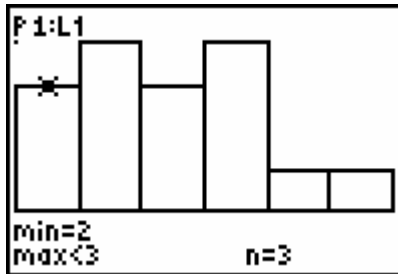
Now press **2<sup>nd</sup>** → **STAT PLOT** (It's the **Y=** key). → **ENTER**

This will get you to the first stat plot. Turn it on by placing the cursor over the **On** and pressing **ENTER**. Your screen should look like the one below.



Move the cursor so that the histogram is highlighted. Since your data is in list 1 you do not need to change that but, if you needed, you could.

The next step is to pull up a window of the correct size for the histogram. The calculator will do that if you press **ZOOM** → **9:ZoomStat** → **ENTER** (Number 9 is below the screen so use your arrow keys to move down the options.) Your histogram will “pop” to the screen. Press the **TRACE** key to get the picture below.



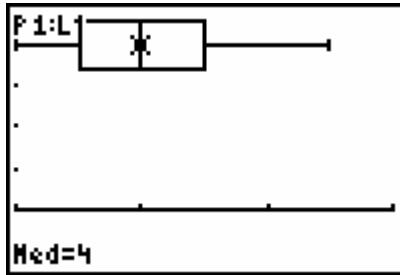
Notice the information at the bottom of the screen. The calculator has set up the first class as  $2 \leq x < 3$  and there are 3 pieces of data in it. Use the right arrow key to move the cursor to the next bar to show that information.

Now press the **WINDOW** key to see what has been selected as the viewing window. Change the **Xmin** to a 1 and the **Xmax** to a 9 and then press **GRAPH** to see the change. The **Xscl** = 1 determined that the bars should have a width of 1. You can also change that if you like.

### **Statistical Graphs:**

#### **Box-and Whiskers Display**

Enter the data above for the Histogram in list 1. Go into the first **STAT PLOT** as above. This time choose the boxplot. There are two of them; the first is a modified boxplot and the second is a regular boxplot. You want the second one (middle of the second row). Use **ZOOM** to scale the graph as above and then press **GRAPH**. You should get the picture below. Pressing **TRACE** and the arrow keys will give the five number summary of (Min, Q1, Med, Q3, Max). The calculator will allow you to compare up to four data sets on the same graph by turning the four plots on.



When you are done remember to turn your plots off. **2<sup>nd</sup> → STAT PLOT → 4:PlotsOff**

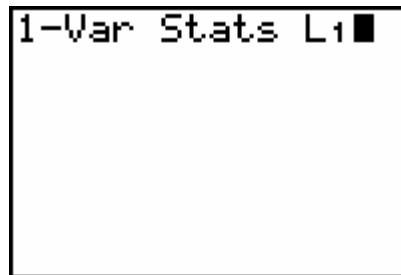
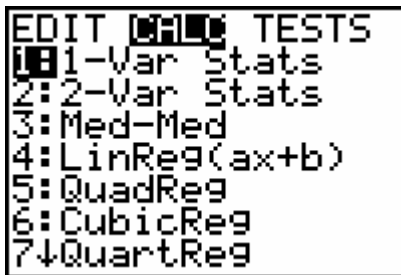
**Basic Statistics:**

The calculator will compute a variety of basic statistics quickly, easily and all-at-once for you. To do so put the data into one of the lists. . Put the following data in list 1 (L1) following the steps above (this is the same data as was used in the histogram):

2, 3, 3, 4, 3.5, 5, 2, 4, 3, 6, 5, 5, 4, 7, 2

Next return to the “Home” screen by pressing **2<sup>nd</sup> → QUIT**

Now enter the statistics menu by pressing **STAT**. Use the arrow key to move the highlighted area over to **CALC**. Each time you move the cursor over to a new word on the top of the computer a new menu appears underneath. One of the options under the CALC menu is **1:1-Var Stats**. This is the command that will compute a variety of statistics for a single variable. Since you have ONE sample to compute statistics this is the menu you want. Press either ENTER or select 1. This will bring the 1-Var Stats to the home screen. Before you press enter tell the calculator which list to use by typing in the name of the list (Remember that



the list names are typed by using **2<sup>nd</sup>** and then the list number). Press ENTER to get the stats!!



```

1-Var Stats
x̄=3.9375
Σx=63
Σx²=281
Sx=1.481834449
σx=1.434780035
↓n=16

```

The calculator gives the **mean** ( $\bar{x}$ ), the **sum of all the data values**, the **sum of the squares of the data values**, the **standard deviation** calculated for a sample and for a population. Note that the calculator does not know if the data was a sample or a population. Since the formulas for the standard deviation for a

```

1-Var Stats
↑n=16
minX=2
Q1=3
Med=4
Q3=5
maxX=7

```

sample,  $s$ , and for a population,  $\sigma$ , are slightly different it computes both. You must know the difference and make the choice. Also note the arrow next to the sample size, "n=16". It is telling you that there is more information below. Use the calculator arrows to move down to view the rest of the information where you will find the quartiles and the max and minimum values in the data set. Cool Dude!

The calculator will also give these same results for grouped or for frequency data. Enter the value (or the class mark for grouped data) into List 1 and the frequencies into List 2. Then use the command:

**STAT**→**CALC**→**1:1-Var Stats L<sub>1</sub>, L<sub>2</sub>**

The calculator will interpret the second list as frequencies. To check make sure that the number of data pieces that the calculator gives as **n** equals the sum of the frequencies.

## Module 2; Section 1

### *Linear Regression graphs* *Scatter diagram*

To create a scatter diagram you will need to enter the data into two lists on the calculator. Enter the following data with the radius in list 1 and the height variable in list 2

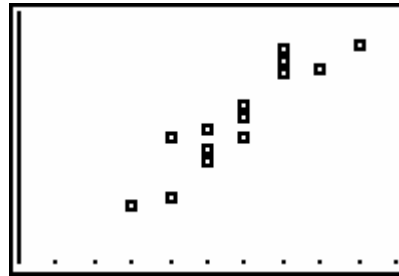
<b>Radius</b>	27	24	29	26	27	25	26
<b>Height</b>	170	150	175	165	174	158	160

<b>Radius</b>	25	24	27	28	26	25	23
<b>Height</b>	161	160	172	171	163	156	149

You will first put the data into two different Lists of the calculator being sure that the pairs of data pieces are kept together. Data piece number 36 in the x-list should correspond to data piece number 36 in the y-list. You will then use the **2<sup>nd</sup> → STAT PLOT → (Choose one) → on → (choose the scatter diagram picture)**. Make sure that the lists for x-axis and y-axis are the correct ones and then **2<sup>nd</sup> → QUIT → ZOOM → 9:ZoomStat** to view the results.

The picture at the right is the diagram of the information above.

The scale on the calculator was using the window command and changing the x-min to 20, x-max to 40, y-140 and y-max to 180.

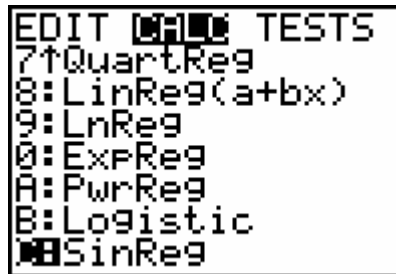
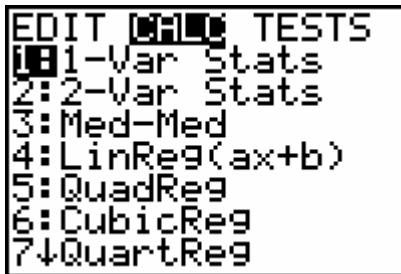


scatter  
set by  
min to

## Module 2; Section 2

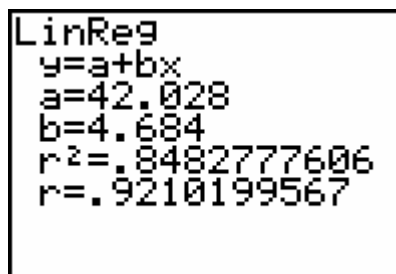
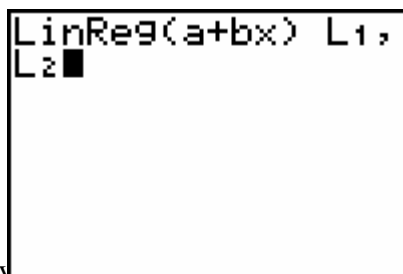
### Computing the Linear Regression Line

Use your calculator to determine the linear regression line using the data above. Enter the radius in column 1 and the height in column 2. Now press the **STAT → CALC** You will get the following screen.



Use the down arrow to get to the rest of the options. Notice that both number four (4) and number eight (8) are linear regression options. You can use either one to get the equation. I find the 8 option to be more convenient at times. Press the **8** key (or highlight the **8:LinReg (a+bx)** and press **ENTER** ) to bring that command to the home screen and then tell the calculator where the data is by typing the list names. **Type the list for the x-data first followed by a comma and the y-data second.**

When you press **ENTER**, you should get the following:

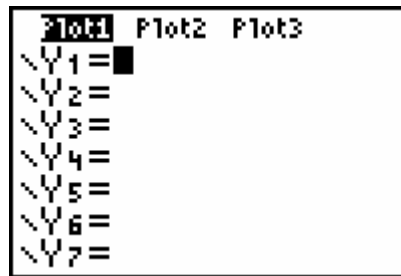


**(NOTE: if you did not get the r-values it is because that option is not turned on on you calculator. To turn that option on press 2<sup>nd</sup> → CATALOG (above the zero key). Arrow down until you get to DiagnosticOn and press ENTER. Once this is turned on it will stay on unless you clear the memory of the calculator. If you repeat the steps for the regression equation you will get the r-values).**

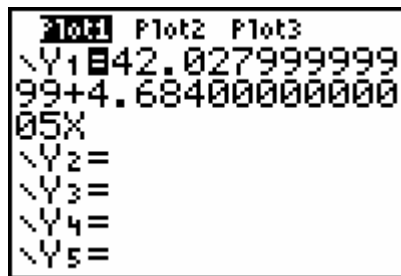
Notice that the values of a and b are displayed separately so that they can be carried out to 9 decimal places.

**To graph the linear regression line on the calculator**

The calculator remembers the last regression line you computed on it and stores it in a memory After you have computed the regression line on the calculator press the **y=** key (located right below the screen). You will get the following screen: Notice that my Plot1 with the scatter diagram in it is still on.



Now press the **VARS →5:Statistics...→EQ→1:RegEQ** sequence of keys. This will put the regression equation into the y1 = equation.



Pressing the **GRAPH** key will give you the graph. You can **TRACE** values on the graph if you like. You can alternate tracing the plot or the line by using the UP arrow or DOWN arrow. Notice that the calculator tells which one is being traced on the top of the screen.

