

Getting your TI-83 to do your Statistics I

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1. Getting started (Basic operations, Numerical Summaries, Outliers etc.)

Let us first do the descriptive Statistics of a given set of data.

Here is some data (without any reference to what it represents):

28	27	24	31	36	37	36	27	26	39	29
26	16	21	19	28	25	26	27	33	28	27
33	40	25	24	25	28	30	28	26	24	28
24	-2	30	20	21	26	22	27	32	25	29
34	29	23	36	28	30	36	31	32	32	16
-44	22	29	32	29	32	23	27	24	25	23

First thing first we know that if the data is put in some order it will be more manageable. You can do it by hand by making an ordered stem-plot of the data. Or you can punch the data in your TI-83. For this, this is what you do:

Turn the calculator on and press the **STAT** button. You will see the following screen:



This is your **STAT screen** and the cursor is on **Edit**. Hit **ENTER** to see the **Edit screen**. The following are possible views of the **Edit screen**.

I				II			
L1	L2	L3	1	L1	L2	L3	1
██████	-----	-----		1792	192	36864	
				1666	66	4356	
				1362	-238	56644	
				1614	14	196	
				1460	-140	19600	
				1867	267	71289	
				1439	-161	25921	
L1()=				L1()=1792			

If you see a clear Edit screen well and good, you are ready for the next step. If however you get the used screen (like II above) you need to clear at least one of the columns to punch your data in. To clear the column **L1** you note that your cursor is in **L1** and press the up arrow once. This is what you will see:

L1	L2	L3	1
1792	192	36864	
1666	66	4356	
1362	-238	56644	
1614	14	196	
1460	-140	19600	
1867	267	71289	
1439	-161	25921	
L1 = (1792, 1666, 1...			

The cursor is on top of **L1**.

Hit the **CLEAR** button and then hit **ENTER**. The effect is the following screen:

L1	L2	L3	1
████████	192	36864	
	86	4356	
	-238	56644	
	14	196	
	-140	19600	
	267	71289	
	-161	25921	
L1(1)=			

You could take the cursor to **L2** and repeat the procedure if you want to clear the data in **L2** as well (as I have done). But you are ready for the next step. (I assume that you have cleared all the lines)

Now punch in the first individual (top left entry). The result is:

L1	L2	L3	1
████████	-----	-----	
L1(1)=28			

Now hit **ENTER** to get

L1	L2	L3	1
28	-----	-----	
████████			
L1(2)=			

Punch in the next entry (next in the top row) and hit **ENTER** to get the following screen:

L1	L2	L3	1
28	-----	-----	
27			
████████			
L1(3)=			

Repeating this procedure you can punch in all the data. (Do that before the next step and ask: **What can I do with this data?** Well you can **Sort** the data (i.e. put it in an ascending or descending order). You can find the mean, standard deviation, and the five number summaries of the data and much more.

2. Sorting the data

Let us suppose that you punched in all the data and you want to sort it in some order. Say you have the edit screen looking like:

L1	L2	L3	1
28	-----	-----	
27			
24			
31			
36			
37			
36			
L1(1)=28			

Of course there are other entries that the screen does not show, but that is all right. Get to the **STAT screen** (by hitting the **STAT** button) to get:

```

0001 CALC TESTS
01>Edit...
02:SortA(
03:SortD(
04:ClrList
05:SetUpEditor

```

Take your cursor one step down:

```

0001 CALC TESTS
01>Edit...
02:SortA(
03:SortD(
04:ClrList
05:SetUpEditor

```

Hit **ENTER**. You get this:

```

15-25
17/22 -10
SortA(.7727272727

```

“**Sort A**” stands for “Sort Ascending” but the calculator wants to know what data is to be sorted. Now your data is in L1. If you look at your calculator’s face (hard enough) you would find **L1 written in orange color above the top left corner of the [1] key**. This means that if you hit [2nd] and then [1] you would get:

```

15-25
17/22 -10
SortA(L1

```

Close the bracket (optional) and hit **ENTER**:

```

15-25
17/22 -10
SortA(L1)
Done

```

This annoying message means. Go look the Edit screen; your data has been put in an ascending order. Check:

L1	L2	L3	1
-2	-----	-----	
16			
16			
19			
20			
21			
L1(1) = -44			

Yeah something has happened, and I recommend that you use the down arrow to go through the data to see that it has been sorted in an ascending order. Now suppose you want, for some reason, the same data sorted in a descending order at the same time. This is what you can do: Move the right arrow once. Your cursor moves to **L2** as you can see:

L1	L2	L3	Z
-44	████████	-----	
-2			
16			
16			
19			
20			
21			
L2(1)=			

Hit the **up arrow** key

L1	L2	L3	Z
-44	-----	-----	
-2			
16			
16			
19			
20			
21			
L2 =			

You see the cursor is actually covering the **L2** sign. Now hit **ENTER** to see this:

L1	L2	L3	Z
-44	-----	-----	
-2			
16			
16			
19			
20			
21			
L2 =			

It looks the same up here but on your calculator the cursor is blinking at the bottom, in front of **L2 =** . Now punch in **L1** you know how (\dots [2nd] and then [1]) to see:

L1	L2	L3	Z
-44	-----	-----	
-2			
16			
16			
19			
20			
21			
L2 = L1			

Hit **ENTER** to see:

L1	L2	L3	Z
-44	-44	-----	
-2	-2		
16	16		
16	16		
19	19		
20	20		
21	21		
L2(1) = -44			

Now what? If you want to arrange the data in L2 in a descending order, go back to the STAT screen (you know how!) and take the cursor down to **Sort D(...** The result will be

15-25	-10
17/22	.7727272727
SortA(L1)	Done
SortD(█	

Punch in **L2** (punching [2nd] and [2]) would accomplish that) close the bracket, hit **ENTER** to see the annoying screen:

17/22	-10
SortA(L1)	Done
SortD(L2)	Done
█	

Now go back to the **EDIT Screen**:

L1	L2	L3	Z
-44	00	-----	
-2	00		
16	00		
16	00		
19	00		
20	00		
21	00		
L2(1)=40			

Something seems to have happened. You can check that **Sort D** has happened. Now here is a question. **Why must you sort Ascending?** Well, you can write the data in ascending order to find (manually) the five-number summary of the data and then you can use it to construct the box plot of the data. You can also use it to construct an ordered stem and leaf plot. Enough of sorting business; let us get back to what the calculator can do for us. I would start with the numerical description of the data and then move on to the graphical description.

3. Numerical Description of data

Let us keep the same data that we started with. But note that you do not need to sort the data to perform any of the following computations.

Get to the **STAT screen** (you know how) and then push the right arrow once to get the following picture:

EDIT	TESTS
1:1-Var Stats	
2:2-Var Stats	
3:Med-Med	
4:LinReg(ax+b)	
5:QuadReg	
6:CubicReg	
7:QuartReg	

You see **CALC** highlighted and you see the cursor on **1-Var Stats**. You want **1-Var Stats**. So, hit **ENTER**. You see the following picture:

SortD(L2)	Done
SetUpEditor	Done
SortA(L1)	Done
1-Var Stats	Done

You see **1-Var Stats** and the cursor blinking in front of it. Punch in **L1** and hit **ENTER**. The calculator seems to go to sleep for a moment and then the following picture appears:

1-Var Stats
$\bar{x}=26.21212121$
$\Sigma x=1730$
$\Sigma x^2=52852$
$S_x=10.74532478$
$\sigma_x=10.6636101$
$\downarrow n=66$

Note the downward arrow and the cursor blinking at the bottom. This means that there is more to come. But let us digest what we have got on this screen. Recall that \bar{x} represents the mean of the data. So this screen tells us that the mean of the data in L1 is 26.2121...

Recall also that Σx represents the sum of all the individuals (entries) of the data. So,

$\Sigma x = 1730$. Next comes Σx^2 which represents the sum of squares of the entries in the data. The next one down the line is S_x , this represents the standard deviation of the data taken as a sample. [This is what you have studied in your book as **the standard**

deviation of the data. Recall that $S_x = \sqrt{\frac{1}{n-1} \sum (x - \bar{x})^2}$. So, according to the calculator, the (sample) standard deviation of the data in L1 is 10.745... Now comes s_x . This is the standard deviation of the data taken as a population. You will come across this definition later. For now suffice it to say that $s_x = \sqrt{\frac{1}{n} \sum (x - \bar{x})^2}$.]]] (**When you see some material within the brackets like [[[]]] it is either review material or informatory material**).

Finally the bottom entry on the screen is **n = 66**. This simply means that the number of entries in **L1** is **66** (that is, there are 66 pieces of data in **L1**). As you press the **down arrow key** the screen starts to change. Keep on pressing the down key until the screen changes no more and you have the following screen:

```

1-Var Stats
↑n=66
minX=-44
Q1=24
Med=27
Q3=31
maxX=40

```

This is the second part of the **1-Var Stats screen**. You have seen what **n = 66** means. Below I will list each of the remaining entries with a brief description:
min X = -44 tells you that the minimum of the data in line L1 is -44. (**X** indicates the fact that the calculator regards the data in line **L1** as a set **X**)
Q₁ = 24 means that the first quartile of the data in **L1** is 24
Med = 27 means that the median of the data set **X** in **L1** is 27,
Q₃ = 31 means that the third quartile of the data set **X** in **L1** is 31 and
max X = 40 says that the maximum of all the entries of the data set **X** in **L1** is 40. I trust that by now you have understood from the lectures what the above terminology means.

[[[Now the question is what other uses can we make of this screen? Well, we can find the range of the data = **Maximum – Minimum**, we can find the inter quartile range **IQR = Q₃ – Q₁ = 31-24 = 7**, and using the **1.5 × IQR** rule we can find that any thing in the data in **L1** is an outlier if it is below **Q₁ - 1.5 × IQR = 24 - (1.5)(7) = 13.5**. Looking at the list we find that there are only two numbers: **-44** and **-2** that are below 13.5 and so these are the lower outliers. Let us see what the upper outliers are. They must be any numbers in the data that are above **Q₃ + 1.5 × IQR = 31 + (1.5)(7) = 41.5**. Now as **max X = 40** there are no upper outliers.]]]

If you have been reading this to this time, I suggest that you take a breather now. Once you are fresh again we will start the graphical description of the data. Let me close this portion with a suggestion: **The neatest way of learning the above material well is to pick up any data set, punch it in your calculator and repeat the above procedures.**