

## Analyzing a List With a Box and Whisker Plot on the TI-82/83

(Screens shown are for the TI-82. The work is similar on the TI-83.)

```
Normal Sci Eng
Float 0123456789
Radian Degree
Func Par Pol Seq
Connected Dot
Sequential Simul
FullScreen Split
```

1. Press MODE. This is how your calculator should be set up for this activity. Use the arrow keys,  $\blacktriangleright$ ,  $\blacktriangleleft$ ,  $\blacktriangleup$ ,  $\blacktriangledown$ , to highlight an option, press ENTER to set the option. Repeat this to make your MODE screen the same as seen on the left.

EDIT CALC	L1	L2	L3
1:Edit...	-----	-----	-----
2:SortA(			
3:SortD(			
4:ClrList			
	L1=		

2. Press STAT. Read each option so that you get familiar with this menu. Then press 1 to get 1:Edit... You will see lists  $L_1$ ,  $L_2$ , and  $L_3$ . Your screen might look different than the one shown.

L4	L5	L6
-----	-----	-----
L4=		

3. Use the arrow key,  $\blacktriangleright$ , to see the other lists available. You will see lists  $L_4$ ,  $L_5$ , and  $L_6$ . Your screen might look different than the one shown.

L1	L2	L3
84	-----	-----
84		
76		
90		
71		
92		
89		
96		
64		
85		
94		
75		
73		
56		
97		
86		
71		
73		
69		
89		
L1(7)=89		

4. Arrow back to list  $L_1$ . Enter the list of scores given below in  $L_1$ . Type the number and then press ENTER. You will be automatically ready to type in the next entry. Notice that each element in the list has a name.  $L_1(7)$  is highlighted on the left. This is the seventh element in the list, the number 89.  
 {84, 84, 76, 90, 71, 92, 89, 96, 64, 85, 94, 75, 73, 56, 97, 86, 71, 73, 69, 89}

EDIT CALC	SortA(L1)	Done
1:Edit...		
2:SortA(		
3:SortD(		
4:ClrList		

5. To sort  $L_1$  in ascending order, press STAT and then 2 for 2:SortA(. This option will come up on your home screen. Press  $2^{\text{nd}}$   $L_1$  and  $)$ . Press ENTER. The sorting is done.

SortA(L1)	Done
L1	
{56 64 69 71 71...	

6. To see  $L_1$ , you can press  $2^{\text{nd}}$   $L_1$  and then press ENTER. You can use the arrow keys,  $\blacktriangleright$  and  $\blacktriangleleft$ , to see the elements. This is one way to see a list.

OPS MATH
1:SortA(
2:SortD(
3:dim
4:Fill(
5:seq(

7. Press  $2^{\text{nd}}$  LIST. Read each option so that you get familiar with this menu.

OPS MATH	
1:min(	
2:max(	
3:mean(	
4:median(	
5:sum	
6:Prod	

8. Arrow  $\blacktriangleright$  to get the LIST MATH menu. Read each option. We will find the maximum, the minimum, the mean and the median values of  $L_1$ .

min(L <sub>1</sub> )	56
█	

9. Press 1 to get 1:min( on the home screen as seen on the left. Press 2<sup>nd</sup> L<sub>1</sub> (above the number 1) then press ) to close the parenthesis. Press ENTER to see the maximum value of  $L_1$ .

max(L <sub>1</sub> )	56
mean(L <sub>1</sub> )	97
median(L <sub>1</sub> )	80.7
█	84

10. Repeat the procedure given in parts 8 and 9 to get the minimum value, the mean, and the median of  $L_1$ . Your home screen should look like the screen on the left.

OPS MATH	
1:SortA(	OPS MATH
2:SortD(	1:min(
3:dim	2:max(
4:Fill(	3:mean(
5:seq(	4:median(
	5:sum
	6:Prod

11. You might want to find the mean value with a calculation. Press 2<sup>nd</sup> LIST and arrow  $\blacktriangleright$  to MATH.

mean(L <sub>1</sub> )	97
median(L <sub>1</sub> )	80.7
sum L <sub>1</sub>	84
█	1614

12. Press 5 to get 5:sum on your home screen. Press 2<sup>nd</sup> L<sub>1</sub> and then press ENTER to get the sum of the numbers in  $L_1$ .

median(L <sub>1</sub> )	80.7
sum L <sub>1</sub>	84
dim L <sub>1</sub>	1614
█	20

13. Next find dim in the LIST OPS menu (see part 11). Find the dimension (size) of  $L_1$ .

sum L <sub>1</sub>	84
dim L <sub>1</sub>	1614
1614/20	20
█	80.7

14. Divide the sum of the list by the size of the list and notice you get the mean of the values in  $L_1$ .

<pre> EDIT CALC 1:Edit... 2:SortA( 3:SortD( 4:ClrList </pre>	<pre> EDIT CALC 1:1-Var Stats 2:2-Var Stats 3:SetUp... 4:Med-Med 5:LinReg(ax+b) 6:QuadReg 7:CubicReg </pre>
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15. **Finding 1-Variable Statistics** - You can get all of the information, and more by following the next procedure! Press STAT. Arrow  $\blacktriangleright$  to CALC.

<pre> 1-Var Stats x̄=80.7 Σx=1614 Σx²=132734 Sx=11.43448155 σx=11.14495402 n=20 </pre>	<pre> 1-Var Stats n=20 minX=56 Q1=72 Med=84 Q3=89.5 maxX=97 </pre>
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16. Press 1 for 1:1-Var Stat. Press ENTER on the home screen. Arrow  $\blacktriangledown$  to get the second screen. Look at all of the information you get!

<pre> STAT PLOTS 1:Plot1...   Off [ON] L1 2:Plot2...   Off [ON] L2 L4 3:Plot3...   Off [ON] L1 L2 4:PlotsOff </pre>	<pre> PlotsOff Done </pre>
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17. **Box and Whisker Plots** - Use the data in L<sub>1</sub> to draw a Box and Whisker Plot. First, you need to make sure that all other plots are turned off. Press 2<sup>nd</sup> STAT PLOT, press 4 for 4:PlotsOff, and then press ENTER. All Statistical Plots are off.

<pre> Y-VARS 1:Function... 2:Parametric... 3:Polar... 4:Sequence... 5:On/Off... </pre>	<pre> ON/OFF 1:FnOn 2:FnOff </pre>	<pre> PlotsOff Done FnOff Done </pre>
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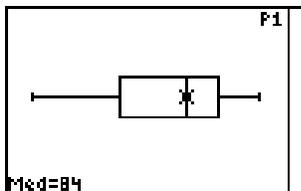
18. Press 2<sup>nd</sup> Y-VARS (above VARS), press 5 for 5:On/Off, press ENTER. All Functions are turned off.

<pre> STAT PLOTS 1:Plot1...   Off [ON] L1 2:Plot2...   Off [ON] L2 L4 3:Plot3...   Off [ON] L1 L2 4:PlotsOff </pre>	<pre> Plot1 [ON] Off Type: [ON] [ON] [ON] [ON] Xlist: [ON] L2 L3 L4 L5 L6 Freq: [ON] L1 L2 L3 L4 L5 L6 </pre>
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19. Press 2<sup>nd</sup> STAT PLOT, press 1 to get into 1:Plot1... Use the arrow keys to setup Plot 1 as seen on the left hand screen. After highlighting an option, press ENTER. Read each line of this menu so that you understand what the calculator will graph.

<pre> ZOOM MEMORY 3:Zoom Out 4:zDecimal 5:zSquare 6:zStandard 7:zTrig 8:zInteger 9:ZoomStat </pre>
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20. Press ZOOM and arrow down,  $\blacktriangledown$ , to 9:ZoomStat. Press 9 and you will see the graph. ZoomStat looks at the data and sets the window of the graph appropriately. You could do this manually using WINDOW.



21. Press TRACE and use the arrow keys to see the minimum, first quartile, second quartile, and maximum value.

To compare up to three sets of scores using a Box and Whisker Plot, you can enter each list and set up the Statistical Plot feature. Here is another set of scores.

$$L_2 = \{72, 87, 91, 52, 82, 74, 63, 65, 75, 79, 83, 87, 78, 61, 77, 85, 83, 80, 50, 79\}$$

<pre> EDIT CALC 1:Edit... 2:SortA( 3:SortD( 4:ClrList         </pre>	<table border="1"> <thead> <tr> <th>L1</th> <th>L2</th> <th>L3</th> </tr> </thead> <tbody> <tr> <td>56</td> <td>50</td> <td>-----</td> </tr> <tr> <td>64</td> <td>52</td> <td></td> </tr> <tr> <td>69</td> <td>61</td> <td></td> </tr> <tr> <td>71</td> <td>63</td> <td></td> </tr> <tr> <td>73</td> <td>65</td> <td></td> </tr> <tr> <td>73</td> <td>74</td> <td></td> </tr> </tbody> </table>	L1	L2	L3	56	50	-----	64	52		69	61		71	63		73	65		73	74	
L1	L2	L3																				
56	50	-----																				
64	52																					
69	61																					
71	63																					
73	65																					
73	74																					

22. Press STAT, then 1 for 1:Edit...  
Enter the list  $L_2$  given above.

<pre> EDIT CALC 1:Edit... 2:SortA( 3:SortD( 4:ClrList         </pre>	<pre> SortA(L2) Done L2 (50 52 61 63 65... </pre>
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23. To sort  $L_2$ , press STAT, press 2 for 2:SortA(), press 2<sup>nd</sup>  $L_2$ , and press ENTER.  
Press  $L_2$  and ENTER to see the ordered list.

<pre> EDIT CALC 1:1-Var Stats 2:2-Var Stats 3:SetUp... 4:Med-Med 5:LinReg(ax+b) 6:QuadReg 7:CubicReg         </pre>	<pre> SortA(L2) Done L2 (50 52 61 63 65... 1-Var Stats L2 </pre>
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24. Press STAT (shown above), arrow to CALC, press 1 for 1:1-VAR Stats. Now you need to tell the calculator to use list  $L_2$  so press 2<sup>nd</sup>  $L_2$  and then press ENTER.

<pre> 1-Var Stats x=75.15 Σx=1503 Σx²=115445 Sx=11.45827671 σx=11.16814667 n=20 </pre>	<pre> 1-Var Stats ↑n=20 minX=50 Q1=68.5 Med=78.5 Q3=83 maxX=91 </pre>
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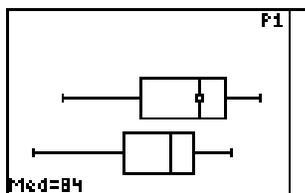
25. You will see all of the statistics on  $L_2$ .  
Read each line. The second screen has the information to make a Box and Whisker Plot.

<pre> STAT PLOTS 1:Plot1...    On <math>\square</math> L1 2:Plot2...    Off <math>\square</math> L2 3:Plot3...    Off <math>\square</math> L1 L2 4:PlotsOff </pre>	<pre> Plot2 Off Type: <math>\square</math> <math>\square</math> <math>\square</math> <math>\square</math> <math>\square</math> Xlist: L1 <math>\square</math> L3 L4 L5 L6 Freq: <math>\square</math> L1 L2 L3 L4 L5 L6 </pre>
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26. Press 2<sup>nd</sup> STAT PLOT. Make sure that Plot 1 is set up for  $L_1$ . Now press 2 for 2:Plot 2... Use the arrow keys and ENTER to set your screen as seen on the left.

<pre> ZOOM MEMORY 3:Zoom Out 4:ZDecimal 5:ZSquare 6:ZStandard 7:ZTri9 8:ZInteger 9:ZoomStat </pre>
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27. Press ZOOM and arrow down,  $\blacktriangledown$ , to 9:ZoomStat. Press 9 and you will see the graphs. ZoomStat looks at the data and sets the window of the graph appropriately. You could do this manually using WINDOW.



28. Press TRACE and use the arrow keys to see the minimum, first quartile, second quartile, and maximum value of both lists. How do they compare?