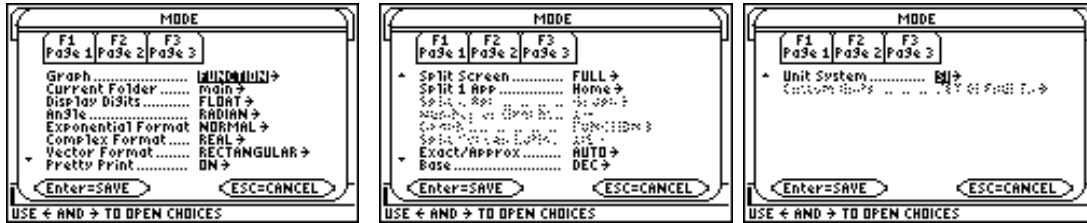


## Using Your TI-89 in Elementary Statistics

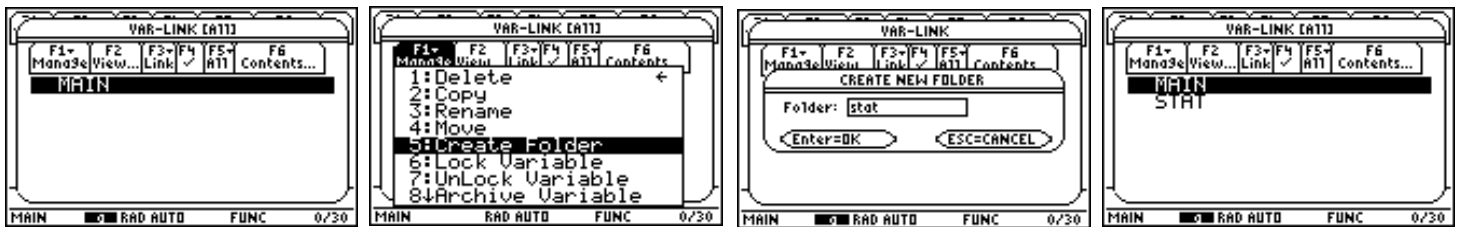
### Level of Handout:

Target: Intermediate users of the TI-89. If you are a new user, pair up with someone in the class that is a bit familiar with the TI-89. You will need to refer back to this handout until you master these commands and procedures. This activity gives you an **“in action” tutorial** on your TI-89. Pay close attention not only to the statistical content but also to the procedures on your TI-89.

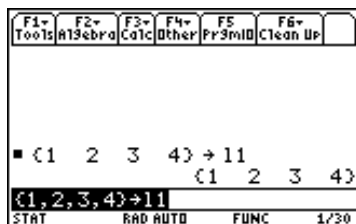
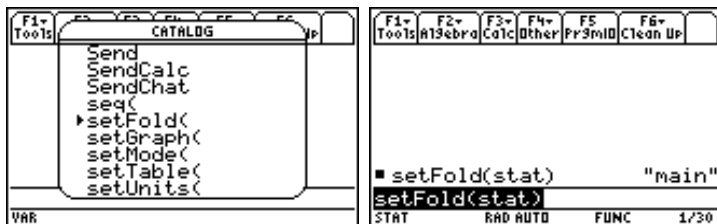
1. **MODE:** You should always know how your calculator is set up. Press **MODE**. You should have your screen set as seen below. Press **ENTER** to save and **ENTER** to return to the home screen.



2. **Creating a Folder:** Press 2<sup>nd</sup> VAR-LINK. Press F1, Manage, and press 5 for 5:Create Folder. We will use the name **stat**. Notice that alpha lock is on. Type as seen below and press **ENTER**. (Using the command NewFold is another option. See Guidebook for details.)

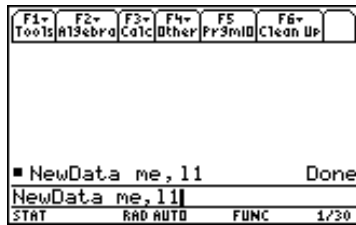


3. **Changing Folders:** Press 2<sup>nd</sup> QUIT to get to the home screen. Notice a very small MAIN on the lower right of your home screen. This means that you are in the MAIN folder. To change the current folder to **stat**, we will use the catalog feature of the TI-89. Press CATALOG, press S to get the commands starting with S. Arrow down to SetFold( and press **ENTER**. Type **stat**) and press **ENTER**. Notice that the lower right corner indicates you are now in the **stat** folder.



4. **Enter a List from the Home Screen:** On the home screen enter {1,2,3,4}→I1 and press **ENTER**.

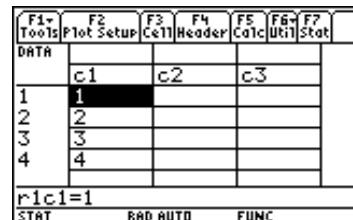
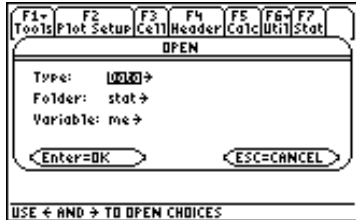
5. If you want to put this list in the Data/Matrix Editor, you will have to use the command: `NewData filename,listname1,listname2,...`



Find NewData in CATALOG

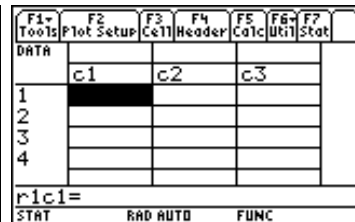
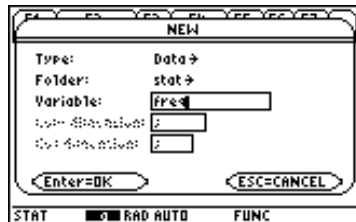
Press APPS, 6.

Press 2 to open.



Open "me."

6. **Enter Data into the Data/Matrix Editor:** Press APPS, press 6 for 6:Data/Matrix Editor and then use the cursor pad to open the submenu as seen below. You will now create a new file, Press 3 for 3:New... Fill in the Dialog box as seen below. This creates the file named *freq* as Data. Press ENTER, ENTER.

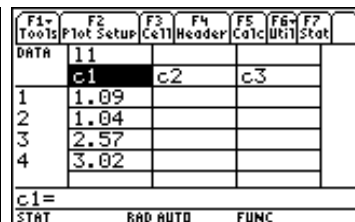
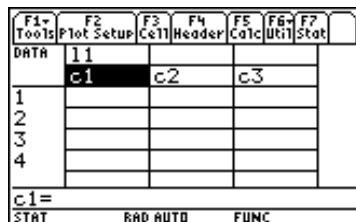
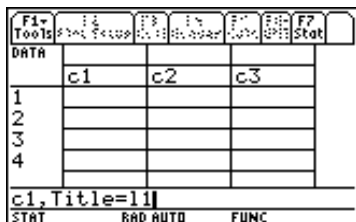


7. **Titles:** You can enter a "title" name for each column. Highlight the area above the c's, notice Title= appears. **Name** the column c1 as 11. Next, **enter** the following list of scores in column c1. Just highlight the cell and enter the value. Use the cursor pad to maneuver cell to cell. See screens on next page.

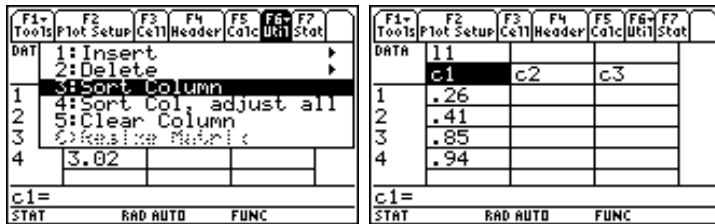
The following list of data is the weight (lbs.) of discarded metals in Household Garbage for one week.

1.09	1.04	2.57	3.02	1.50	2.10	1.93	3.57	2.32	1.89	3.26	3.99	2.04
0.99	2.96	1.50	2.43	2.97	1.42	3.60	4.48	1.36	2.11	0.41	2.02	3.27
4.95	1.00	1.55	1.41	1.05	1.31	2.50	2.35	3.69	3.61	1.49	1.36	1.73
0.94	1.33	2.62	1.25	0.26	4.41	3.22	1.86	1.76	2.83	2.74	4.63	1.70
3.29	1.22	3.20	3.09	2.58	1.67	0.85	1.52	1.37	1.32			

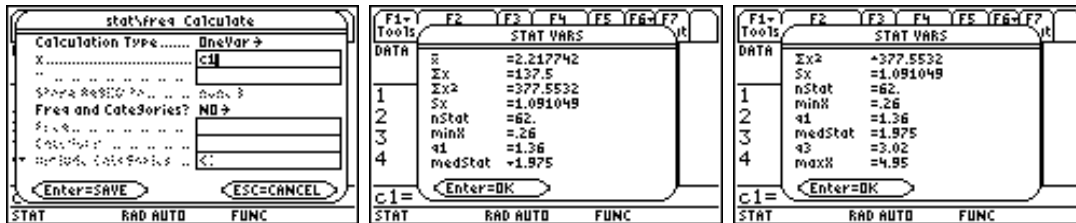
Modified from Triola, Appendix B, Data Set 1



8. **Sorting Data:** To sort this list of data, press 2<sup>nd</sup> F6, Utilities, and then 3 for 3:Sort Column.

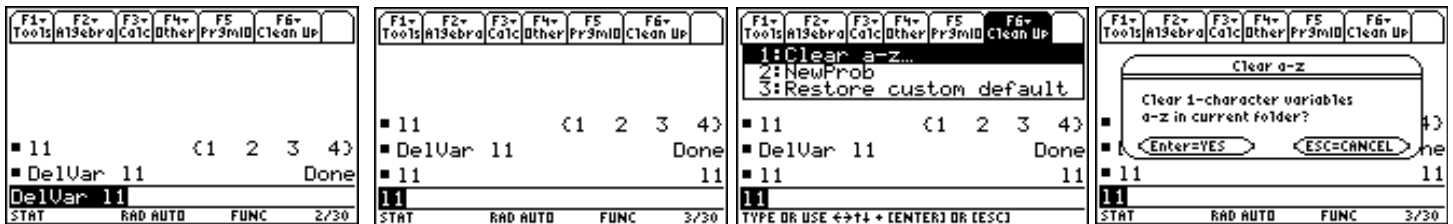


9. **One Variable Statistics:** Press F5, Calculate, and highlight TwoVar→, use the cursor pad to open the Dropdown menu, and press 1 for 1:OneVar. Set up the first screen shown below. Press Enter to SAVE and ENTER to see the statistics. Use the cursor pad to arrow down to see all of the information.



10. **Deleting a Variable:** Earlier in the handout you entered list 11 on the home screen. This is different from the title 11 you entered above. Now, you will delete the list 11. **This is practice!** Press 2<sup>nd</sup> QUIT to get to the home screen. Type 11 on the command line of the home screen and press ENTER. (Shown below.) You should see the list you entered earlier. Notice that it is not column c1! Type **DelVar 11** and press ENTER. If you now enter 11 on the command line, the TI-89 shows 11. (You can also find DelVar in CATALOG.)

**Deleting One Letter Variables:** Press F6, Clean Up, now. Press 1:Clear a-z to clear all one letter variables in the folder. At times, you will need to clear these variables. Your memory can get full. **Remember this!**



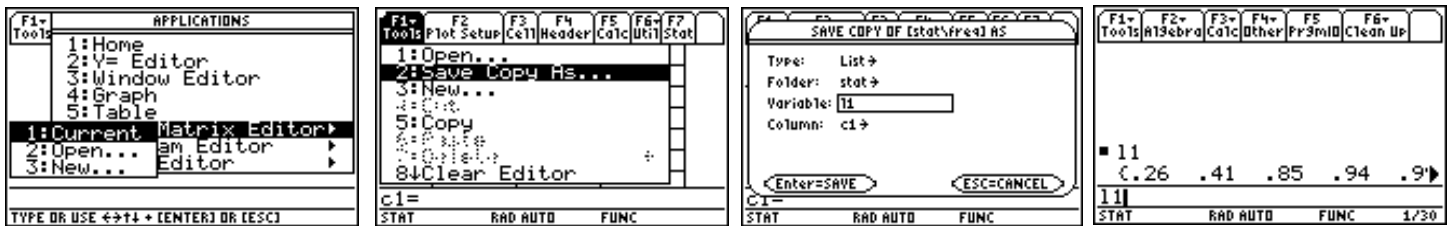
11. **Deleting a Folder or a File:** Note: Your TI-89 will display different files and folders than seen in the screens below. As you use your TI-89, you will be creating folders, files, and variables. You will need to delete these at times. From the home screen, press 2<sup>nd</sup> VAR-LINK. On the screen below, you see that on this demo calculator, the line 14 highlighted and a ✓ in front of 14 (press F4 to toggle the ✓ on and off). Press F1, Manage, and then 1 for 1:Delete. The TI-89 will ask you if you are sure you want to delete everything with a ✓. Make sure you do! See screens on the following page.



### 12. Linking with another TI-89:

You can share programs, files, and variables with another TI-89. Link the two TI-89's with the cable that comes with the calculator. The I/O port is on the bottom of the calculator. Press 2<sup>nd</sup> VAR-LINK on both TI-89's. Check off any file or folder that you want to transfer using F4, ✓. Press F3, Link, and select 1:Send to TI-89/92 Plus or 2:Receive. Wait for the transfer to finish. If there are any problems, check to see that the cable is firmly pressed into the calculators and repeat the steps for linking. See the Guidebook if you need more details.

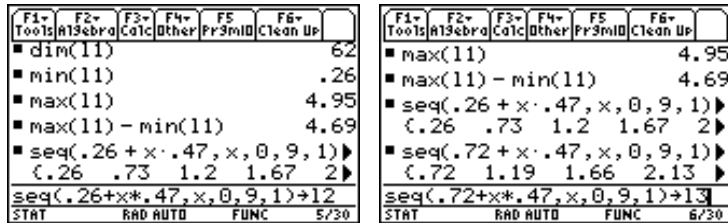
**13. Save a Column in the Data/Matrix Editor as a List:** Press APPS, 6 for 6:Data/Matrix Editor, and press 1 for 1:Current. This gets you back in the editor. You have to save column c1 as the list l1 even though you named the column l1. Press F1, tools, and then 2 for 2:Save Copy As... A Dialog box will appear, change the items as seen below. Press ENTER, ENTER to SAVE. The TI-89 now knows where the list is! Press 2<sup>nd</sup> QUIT to get to the home screen. Press l1 and you'll see the list.



**14. Creating a Frequency Chart and a Histogram:** Fill in the following information to assist you in building a Frequency Chart and a Histogram by hand and using the TI-89. Use commands on your TI-89 whenever you can to increase your familiarity with the TI-89.

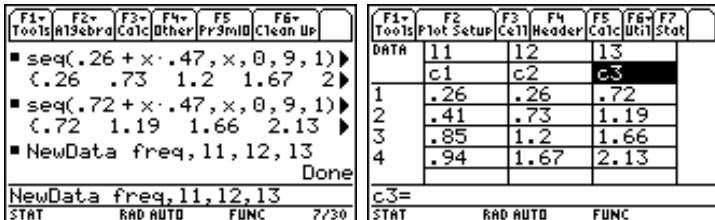
a. Sort the data in ascending order. (This was done in the Data/Matrix Editor. )	
b. Find the number of data. (Hint: dim(l1) ENTER on command line of the home screen. )	Number of data points _____
c. Find the minimum and maximum value.	Max = _____ Min = _____
d. Find the Range of the data. (Hint: max(l1) - min(l1) )	Range = _____
e. Select the number of classes. Choose 10 for this example.	Number of classes = <u>10</u>
f. Find the class width. Class Width = round up (range ÷ # of classes)	Class Width = _____ (Should be .47 for this example.)

15. Lower class limits - Start with minimum value of the data and add the class width to fill in this column. Look at the screens below. From the home screen press CATALOG, and then S for the commands beginning with S. Notice the syntax appears at the lower left. Type,  $\text{seq}(.26+x*.47,x,0,9,1)\rightarrow 12$  and then ENTER. This forms the list  $.26+(0)(.47)$ ,  $.26+(1)(.47)$ ,  $.26+(2)(.47)$  and so on for the 10 classes. The list is stored in I2. Highlight the output and you can scroll through the values in I2, second screen below). Copy these values in the table on page 5. **Remember that I2 is not yet in the Data/Matrix Editor.**



16. **Upper Class Limit:** Fill in this list by using the next highest, lower class limit as the guide. For example, .73 is the second entry in I2. The first entry of I3 will be .72. Enter the upper class limits in list I3. Look at the third screen above. Type  $\text{seq}(.72+x*.47,x,0,9,1)\rightarrow 13$  and press ENTER. Copy these values in the table below.

17. **Enter the computed list in the Data/Matrix Editor:** Press CATALOG and then N. Arrow down to NewData. Notice the syntax appears in the lower right corner. Press ENTER. Type so that the command reads: NewData freq,I1,I2,I3 and then press ENTER. The second screen below displays the Data freq. Remember APPS, 6:Data/Matrix Editor, 2:Open, fill in freq and press ENTER gets you to this screen. The titles I1, I2 and I3 will have to be entered by you.



Class Boundaries	Lower	Upper	Class Boundaries	Class Marks	Frequency	Total Freq	Rel Freq	Cum Freq
.255	.26	.72	.725					
.725	.73	1.19	1.195					

18. Enter Frequencies - Use the sorted list in I1 to count the number of data in each class. Use the table on page 5 to tally your count. Enter and save the frequencies in list I4 as shown below.

F1+ Tools	F2+ Plot Setup	F3+ Cell	F4+ Header	F5+ Calc	F6+ Util	F7+ Stat
DATA	12	13	14			
	c2	c3	c4			
1	.26	.72	2			
2	.73	1.19	7			
3	1.2	1.66	15			
4	1.67	2.13	11			
r1c4=2						
STAT RAD AUTO FUNC						

F1+ Tools	F2+ Plot Setup	F3+ Cell	F4+ Header	F5+ Calc	F6+ Util	F7+ Stat
1: Open...						
2: Save Copy As...						
3: New...						
4: Quit						
5: Copy						
6: Paste						
7: Print						
8: Clear Editor						
r1c4=2						
STAT RAD AUTO FUNC						

F1+ Tools	F2+ Plot Setup	F3+ Cell	F4+ Header	F5+ Calc	F6+ Util	F7+ Stat
SAVE COPY OF (stat\freq) AS						
Type:	List →					
Folder:	stat →					
Variable:	I4					
Column:	c4 →					
Enter=SAVE ESC=CANCEL						
r1c4=2						
STAT RAD AUTO FUNC						

19. Relative Frequency - Class frequency ÷ sum of all frequencies. The number of data points is 62. Highlight c5 and type I4/sum(I4) which gives (class frequency)/(sum of frequencies). Press ENTER. Put in the title I5 and also save this as list I5. Enter this list in your table on page 5. Notice c5 is locked.

F1+ Tools	F2+ Plot Setup	F3+ Cell	F4+ Header	F5+ Calc	F6+ Util	F7+ Stat
DATA	13	14	15			
	c3	c4	c5			
1	.72	2				
2	1.19	7				
3	1.66	15				
4	2.13	11				
c5=						
STAT RAD AUTO FUNC						

F1+ Tools	F2+ Plot Setup	F3+ Cell	F4+ Header	F5+ Calc	F6+ Util	F7+ Stat
DATA	13	14	15			
	c3	c4	c5			
1	.72	2	1/31			
2	1.19	7	7/62			
3	1.66	15	15/62			
4	2.13	11	11/62			
c5=I4/(sum(I4))						
STAT RAD AUTO FUNC						

F1+ Tools	F2+ Plot Setup	F3+ Cell	F4+ Header	F5+ Calc	F6+ Util	F7+ Stat
SAVE COPY OF (stat\freq) AS						
Type:	List →					
Folder:	stat →					
Variable:	I5					
Column:	c5 →					
Enter=SAVE ESC=CANCEL						
r1c5=1/31						
STAT RAD AUTO FUNC						

F1+ Tools	F2+ Algebra	F3+ Calc	F4+ Other	F5+ PrbMID	F6+ Clean Up
cumSum(15)					
(.032258064516 .1451612)					
CUMSUM(15)					
STAT RAD AUTO FUNC 1/30					

20. Cumulative Frequency - Sum of the frequencies for that class and all previous classes. Do this from the home screen, 2<sup>nd</sup> QUIT, using the command cumSum(. Pull up this command from the CATALOG. Press green  $\blacklozenge$  to get the approximate values. Notice that cumSum gives you a list. Check out some of the values. Write this list in your table on page 5.

21. **Setting up the Histogram:** Enter the Data/Matrix Editor again. Press F2, Plot Setup, and then F1, Define. Set up your screen as shown below. Press ENTER, ENTER. To set up the window, press green  $\blacklozenge$  WINDOW and set your window as seen below.

F1+ Tools	F2+ Plot Setup	F3+ Cell	F4+ Header
stat\freq			
Define Copy Clear			
Plot 1:			
Plot 2:			
Plot 3:			
Plot 4:			
Plot 5:			
Plot 6:			
Plot 7:			
Plot 8:			
STAT RAD AUTO FUNC			

F1+ Tools	F2+ Plot Setup	F3+ Cell	F4+ Header	F5+ Calc	F6+ Util	F7+ Stat
stat\freq Plot 1						
Plot Type:	Histogram →					
X:	I1					
Hist. Bucket Width:	.47					
Freq and Categories?	NO →					
Enter=SAVE ESC=CANCEL						
STAT RAD AUTO FUNC						

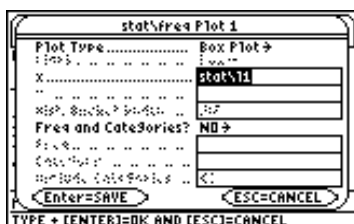
F1+ Tools	F2+ Zoom
xmin=.255	
xmax=5.	
xscl=.47	
ymin=-10.	
ymax=20.	
yscl=5.	
xres=2.	
STAT RAD AUTO FUNC	

22. Press green  $\blacklozenge$  Y= and make sure that only your plot is selected. Use F4,  $\checkmark$ , to select or deselect a function or plot. Press green  $\blacklozenge$  GRAPH to see the histogram. Press F3, Trace, to trace through the histogram.

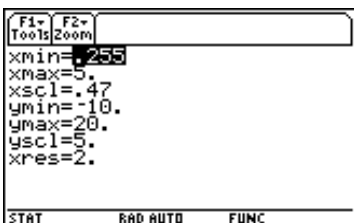
F1+ Tools	F2+ Zoom	F3+ Edit	F4+ All	F5+ ZOOM	F6+ ZOOM	F7+ ZOOM
Data:stat\freq						
Plot 1:						
Plot 2:						
$\checkmark$ Plot 1: x:stat\I1 b:.47						
y1=						
y2=						
y3=						
y4=						
y5=						
STAT RAD AUTO FUNC						

F1+ Tools	F2+ Zoom	F3+ Trace	F4+ ReGraph	F5+ Math	F6+ Draw	F7+ Pen
P1						
min:1.195						
max:1.665						
n:15.						
STAT RAD AUTO FUNC						

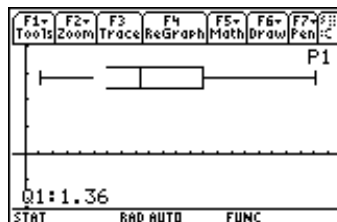
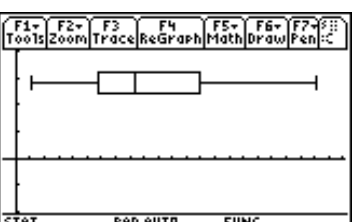
23. **Graph a Box Plot:** Press APPS, 6:Data/Matrix Editor and then open the data file **freq.**



Press F2 for Plot Setup, then press F1 for Define. Set your screens as shown. To set up the graphing window, press green  $\blacklozenge$  WINDOW, press F2 for Zoom, and press 9 for 9:ZoomData.



Press F3 for Trace and you will see the quartiles on the bottom of the screen. Use the cursor pad to trace.



### Running a Program on the TI-89

24. You have three ways of getting a program on your TI-89. You can type it in, link and receive from another TI-89/TI-92 Plus, or you can get a program from a web site and use the TI Graph Link to send the program to your calculator. Here, it is assumed that you have the program on your calculator.

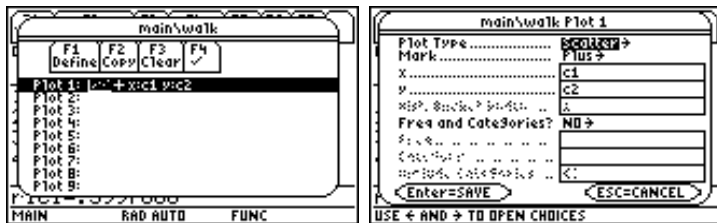
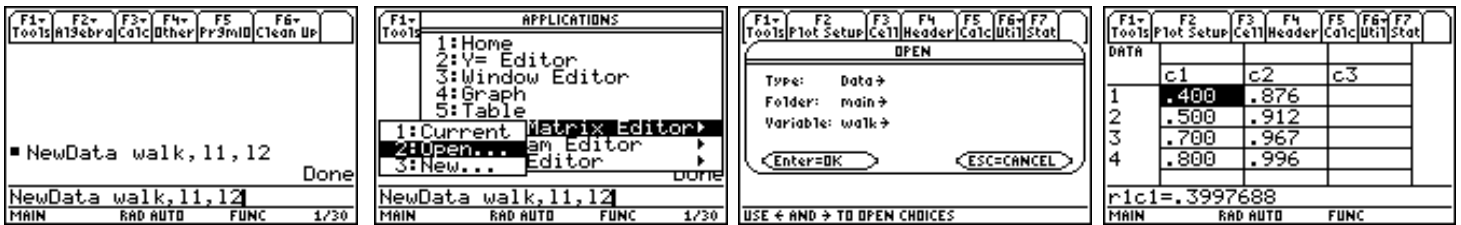
From the Home Screen, press 2<sup>nd</sup> VAR-LINK, highlight the program you would like to run and press ENTER. Press ENTER to run the program. The program shown is RANGER which will not run if the calculator is not hooked up to the CBR. Press ON or 2<sup>nd</sup> QUIT to break a program.



### Regression on the TI-89

The following steps assume that you have a list named I1 and I2 of equal dimension. See earlier steps to enter lists. The following steps give instruction to find the line of best fit. Use the command NewFold( on the home screen to change the current folder to MAIN.

25. As stated earlier, to put lists in the Data/Matrix Editor , you will have to use the command: `NewData filename,listname1,listname2,...` Next, press APPS, 6 for 6:Data/Matrix Editor, and then 2:Open.... Set up the screens below.

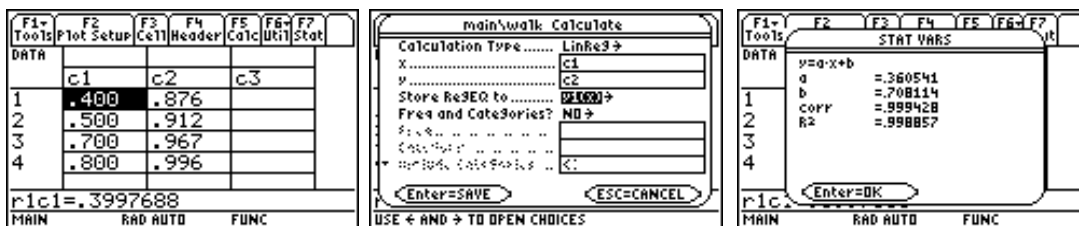


26. Press F2 for Plot Setup and then F1 for Define.

27. Next, press green  $\blacklozenge$  WINDOW. Press F2 and choose 9:ZoomData. You should see the graph of your data.



28. **Linear Regression:** Press APPS, 6:Data/Matrix Editor, and choose 1:Current. Press F5 Calc. Setup the Calculate screen as shown. Press ENTER and you will see the regression equation.



29. Press green  $\blacklozenge$  Y=, and you will see that both Plot1 and y1 are selected. Deselect any other plots or graphs using F4,  $\checkmark$ , to select and deselect graphs. Press green  $\blacklozenge$  GRAPH and you will see both graphs.

