

TI-83+ / TI-84+  
Statistics Calculator  
Manual

~ Written By ~

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Note – This guide applies to the TI-83, TI-83+, TI-84, and the TI-84+. For those lucky few with a TI-89 or TI-89 Titanium, contact either Raymond Dong or Jeff Eaton.

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## Chapters 1-3 – Lists, Data, and Plots

Press [Stat] and select edit. (The first item) This screen has the list names of usually L1, L2, L3, etc.

L1	L2	L3	1
1.700	-----	-----	
2.100			
.800			
3.500			
1.500			
2.600			
2.100			
L1(1)=1.7			

Bar charts / histograms

Press [2<sup>nd</sup>] STAT PLOT (the “y=” button)

This is an overview of each of the 3 plots available for use. It gives the name of each, whether the plot is on or off, the kind of plot it is, and which lists each plot is using for data.

Select a plot to edit by pressing enter.

```

Plot1 Plot2 Plot3
Off Off
Type: [dot] [line] [bar]
      [square] [circle] [triangle]
Xlist: LISTX
Ylist: LISTY
Mark: [square] + .
  
```

This screen gives all of the various settings and options for the plot. The most important setting at this screen is TYPE. You can choose between a dot plot /

scatter plot, line graph, bar graph / histogram, mod box plot, box plot, and some unimportant sixth thing.

You may note the 2 kinds of box plots. The mod box plot accounts for outliers automatically, but may not be accurate. If you choose to use it, be sure to double check the length of the whiskers. Their max length should be 1.5 times the IQR.

Once you choose the type of plot to use, hit the down arrow until you're at the Xlist field. Enter a list to use by hitting [2<sup>nd</sup>] and then L1 (1), or whichever list you want to use. If you're using a plot with a field named "Freq", leave it at 1 and don't mess with it.

Once you have the lists selected and everything is good to go, you can go to the [GRAPH] button and look at the plot. However, a better thing to do would be to go to the [ZOOM] button and select option 9, ZoomStat. This will size the window to fit the plot.

If on the scatter plot and the line graph you get some sort of error, make sure that both selected lists have the same number of elements.

## Chapter 4 – One Variable Statistics

After you enter the data into a list, typically L1, press the [STAT] button, hit the right arrow to move to the CALC menu, and then select option 1, 1-Var Stats. Hit enter a second time, and this will give a printout of various statistics about the data.

: Mean

$\Sigma x$  : Sum (Total of all the data)

$\Sigma x^2$  : Sum of the squared data.

Sx : Standard Deviation (sample) -Always use this one unless he says otherwise

$\sigma x$  : Standard Deviation (population)

n : Number of elements in the list

minX : Minimum

Q<sub>1</sub> : First Quartile

Med : Median

Q<sub>3</sub> : Third Quartile

maxX : Maximum

```
1-Var Stats
x̄=73.329180
Σx=4473.080000
Σx²=360943.849
Sx=23.429525
σx=23.236686
↓n=61.000000
█
```

# Chapter 5 – Two Variable Statistics and Regressions

Before performing a regression, be sure to have the data entered into two lists already. Be sure to use L1 and L2, or else you're going to make things much too complicated.

To perform a linear regression, press STAT, go to the CALC menu, select option 8: LinReg(a+bx), and press enter.

This is an example of what you should get. (Your numbers will be different)

$$y = a + bx$$

$$a = -8.92$$

$$b = 1.60$$

Plugging these figures into the linear equation  $y = a + bx$ , we get  $y = -8.922 + 1.603x$ , which can be used to predict a Y variable given the X variable or an X variable given a Y variable.

For example: if X equals 2, plug it in the equation, and Y will equal -5.716

## Computing the Equation of the Regression Line and the Correlation Coefficient

1. Enter the x values into List L<sub>1</sub>.
  2. Enter the y values into List L<sub>2</sub>.
  3. Press STAT.
  4. Select the CALC menu title.
  5. Select menu item #8, LinReg(a + bx). (Menu item #4 is similar, but I prefer #8.)
  6. Press ENTER. LinReg(a + bx) appears in the display.
  7. Press ENTER. It shows the values of a and b, as well as r and r<sup>2</sup>. Note that b is the slope and a is the y-intercept.
- Graphing the Regression Line
    1. Follow the above steps to compute the equation of the regression line. A consequence of this is that the coefficients will be stored in the calculator. (This step is necessary.)
    2. Press Y= (in the upper left corner).
    3. Select a function variable by moving the cursor to that line, say Y1.
    4. Press VARS. Some menu titles appear. The VARS menu title is highlighted
    5. Use the down arrow to select menu item #5, Statistics...
    6. Press ENTER. The Statistics menu titles appear.
    7. Select the EQ menu title.
    8. Press ENTER to select menu item #1, RegEQ. This is the expression a + bx that was previously calculated. It is now pasted into the function Y1.
    9. Create a scatter diagram. When the scatter diagram is drawn, the regression line will also be drawn.

# Chapter 9 – Confidence Intervals

- **Method 1 - Data**
  1. Enter the sample data into a list, say  $L_1$ .
  2. If the standard deviation of the population is unknown, then find the standard deviation of the sample. Record this number.
  3. Press STAT. The STAT menus appear and the EDIT menu title is highlighted.
  4. Select the TESTS menu title. The TESTS menu appears.
  5. Select ZInterval, item #7. A list of options appears.
  6. On the first line are two options: Data and Stats. Use the arrow keys to select Data.
  7. Press ENTER.
  8. Press the down arrow once.
  9. Enter the standard deviation of the population, if it is known. Otherwise, enter the standard deviation of the sample.
  10. Press the down arrow once.
  11. Enter the name of the list ( $L_1$ ) that contains the data.
  12. Press the down arrow twice, skipping over the Freq option.
  13. Enter the confidence level as a decimal, not a percent.
  14. Press the down arrow once. The word Calculate begins to flash.
  15. Press ENTER. The confidence interval appears, in interval notation, along with the sample mean, sample standard deviation, and sample size.
- **Method 2 - Statistics**
  1. Follow Steps 3 – 5 in Method 1 above.
  2. Use the arrow keys to select the Stats option.
  3. Press ENTER.
  4. Press the down arrow once.
  5. Enter the standard deviation of the population, if it is known. Otherwise, enter the standard deviation of the sample.
  6. Press the down arrow once.
  7. Enter the mean of the sample.
  8. Press the down arrow once.
  9. Enter the sample size.
  10. Press the down arrow once.
  11. Follow Steps 13 – 15 in [Method 1](#) above. The confidence will appear along with the sample mean and the sample size.



```

Z-Test
Inpt: Data Stats
μ₀: 12
σ: .07
List: L1
Freq: 1
μ: 11.6 < μ₀ > μ₀
Calculate Draw

```

Now we must highlight either "Data" or "Stats".  
 If we want to enter the data ourselves we choose "Stats".  
 For our problem we highlight "Stats" and press   
 Arrow down and change settings to match this screen. (see screen above)

Highlight "Calculate" and press ENTER ( this screen will appear)

We can see from the screen that the "p" value is 0.014 which is less than 0.02. So we reject  $H_0$ .

**Example 2 ( Two Tailed Z-Test )**

A particular bottled beer filling process is designed to fill bottles with a mean of 12 Fl. Oz. This process has a standard deviation of .07 Fl. Oz. Quantities over or under this amount are undesirable.  
 A sample of 10 bottles is taken to determine if the process is within limits. These are the sample volumes:

{ 11.6 12.1 11.9 12.8 11.9 12.0 12.4 11.6 11.8 12.3 }

Using a 0.05 level of significance, test to see if the sample results indicate the filling process is functioning properly.

For this problem:  $H_0: \mu = 12$  ;  $H_a : \mu \neq 12$

On the calculator we will first enter the data into LIST1.  
 Next we will go to the "TESTS" menu. So press   
 Arrow right to "TESTS"( you will see this screen)

```

Z-Test
μ<40000
z=-2.19089023
P=.0142298183
x̄=39600
n=30

```

Highlight "1 : Z Test..." Press  (this screen will appear)

```
EDIT CALC TESTS
1:Z-Test...
2:T-Test...
3:2-SampZTest...
4:2-SampTTest...
5:1-PropZTest...
6:2-PropZTest...
7↓ZInterval...
```

Once again we must choose either "Data" or "Stats". This time we will choose "Data". Arrow down and change the settings to fit our problem.

$\mu = 12$  ,  $\sigma = .07$  . Recall we always test  $H_a$ .

Highlight "Calculate" and press  (you will see this screen)

```
Z-Test
Inpt: Data Stats
μ₀: 12
σ: .07
List: L₁
Freq: 1
μ: μ₀ < μ₀ > μ₀
Calculate Draw
```

From the screen we see the "p" value is .071 which is greater than 0.05

Therefore we can not reject  $H_0$  .

*Hypothesis Testing  
One Tailed T-Test*

Always start each new problem from the home screen

A local Flea market business decided to sell their own "Salsa in a jar". The process of "canning" the salsa is designed to produce a mean of at least 120 jars of salsa per batch. Quantities under this amount are undesirable. A sample of 10 batches shows the following numbers of jars of salsa:

{ 108 118 120 122 119 113 124 122 120 123 }

Using  $\alpha = 0.05$  , test to see if the sample results indicate the "canning" process is functioning properly. For this problem we have unknown sigma, and small sample

size so we need to use a "T=Test" For this problem  $H_0 : \mu \geq 120$  ;  $H_a : \mu < 120$ , so reject  $H_0$  if  $p < .05$

To begin this problem we first enter the sample data into "List1" Next, on the calculator go to the "TESTS" menu. Press **2ND**

```
EDIT | CALC TESTS
1: Edit...
2: SortA(
3: SortD(
4: ClrList
5: SetUpEditor
```

Arrow right to "TESTS" next Arrow down to "2 : T-Test..." Press **2ND** (you will see this screen)

```
T-Test
Inpt: DATA Stats
 $\mu_0$ : 120
List: L1
Freq: 1
 $\mu$ :  $\neq \mu_0$   $< \mu_0$   $> \mu_0$ 
Calculate Draw
```

Once again we must choose between "Data" and "Stats". We will choose "Data" for this problem because we have entered the actual data into list1. Change the other settings on your calculator to match the screen above. Recall we always test  $H_a$  so make sure you highlight the appropriate choice, " $< \mu_0$ "

Press **2ND** Arrow down to highlight "Calculate". Press **ENTER**

```
T-Test
 $\mu < 120$ 
t = -.7053278934
P = .2492266222
 $\bar{x}$  = 118.9
Sx = 4.931756505
n = 10
```

(you will see this screen)

You can see from the screen that the p-value is .24, which is not less than .05. Therefore we can not reject  $H_0$ . Our conclusion would be: There is not sufficient evidence at the  $\alpha=.05$  level to reject the claim that the mean number of jars produced is at least 120.

**Example 2 ( Two Tailed T-Test )**

Consider the following hypothesis test:

$H_0 : \mu = 20$

$H_a : \mu \neq 20 .$

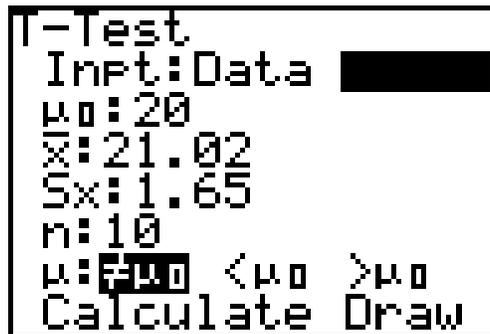
Data from a sample of 10 items gave the following results:

Sample mean = 21.02,  $s = 1.65$ .

At what level of  $\alpha$  would you reject  $H_0$ ?

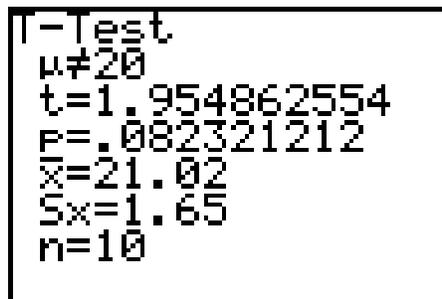
A T-Test is needed in this situation since we have a small sample with unknown population distribution and unknown population  $s$ . Remember we reject  $H_0$  if  $p < \alpha$ . We need to determine the p-value for this problem and then we will have our answer. If alpha is greater than our p-value then we would reject  $H_0$ .

On the calculator go to the "Tests" menu. Arrow right to "TESTS" and down to "2 : T D Test..." Press  ( see screen below)



Match previous settings on your calculator.

Arrow down to "Calculate" and press  (this screen will appear)



We can see that the p-value at which we would reject  $H_0$  is .082 .

This means that if alpha were greater than .082 ,(  $\alpha > p$ ), we would reject  $H_0$