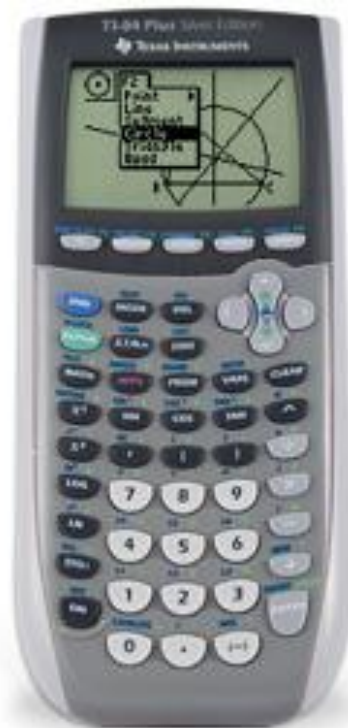


How Does My TI-84 Do That



A guide to using the TI-84 for statistics

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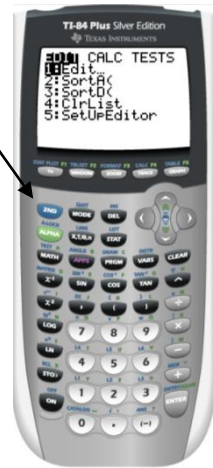
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Understanding the Instructions in this Guide

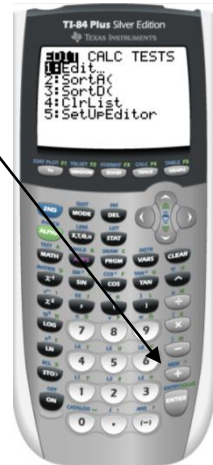
In order to provide consistency in instructions, the following conventions will be used to describe procedures.

- [] indicates a particular key which should be pushed. (example: [2nd] indicates the key in the upper left corner of the calculator, marked 2nd.)
- < > indicates a name or function associated with a key after the [2nd] or [Alpha] key has been pressed. (example: [2nd] <Mem> indicates student should press the [2nd] key first. At this point, the names or function of the keys are the names printed in blue over the key. The student will find “Mem” printed above the [+] key.)
- { } indicates an item selected from a list. (example: {ClrList} indicates the students should scroll down the list displayed on the screen and select the item named “ClrList”.)
- Numbers will be shown as just the number without indicating which keys to press in order to enter the number.

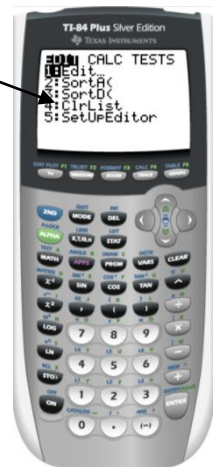
[2nd]



[2nd]
<Mem>



{ClrList}



Basic Operations

Clearing the memory

Sometimes, you may find it necessary to clear the memory on your calculator and reset all the defaults.

Warning: doing this will wipe out any stored programs which you may have on your calculator.

To clear the memory and reset defaults: press [2nd], <Mem>, {Reset}, {All}, {All Memory}, {Reset}

You will receive a message informing you that the memory has been cleared.

```
MEM MGMT
1:About
2:Mem Mgmt/Del...
3:Clear Entries
4:ClrAllLists
5:Archive
6:UnArchive
7:Reset...
```

```
RAM ARCHIVE ALL
All Memory...
```

```
RESET MEMORY
1:No
2:Reset
Resetting ALL
will delete all
data, programs &
Apps from RAM &
Archive.
```

```
TI-84 Plus Silver Edition
2.40

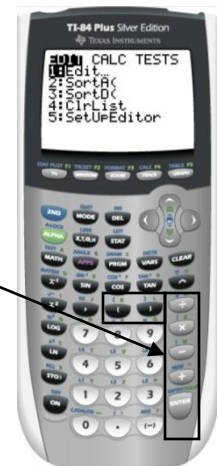
Mem cleared
```

Arithmetic operations

Arithmetic operations are performed using the five gray function keys on the right side of the calculator ([÷], [×], [-], [+], and [Enter]) and the two parenthesis keys ([(] and [)]).

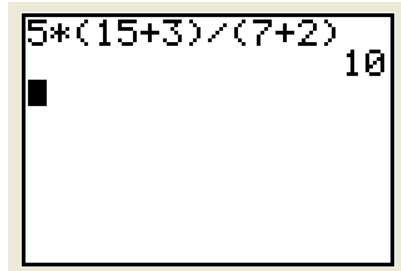
The calculator performs the calculations inside parentheses prior to the other calculations.

Keys for arithmetic operations



Example: To calculate $5(15+3)\div(7+2)$ press the following keys:

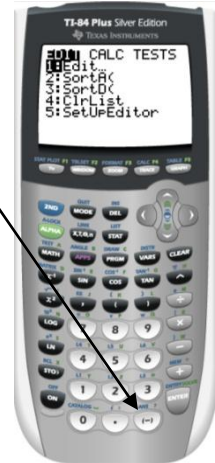
5, [×], [(], 15, [+], 3, [)], [÷], [(], 7, [+], 2 [)], [Enter]



Negative Numbers

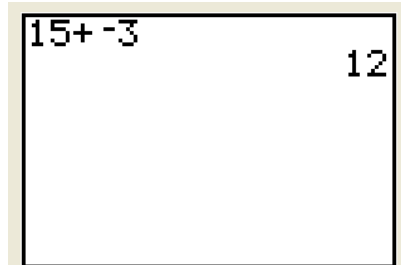
The TI-84 calculator uses a separate key to denote negative numbers. The $[-]$ (inverse or negative key) is located on the bottom row of the calculator, on the right hand side. Frequently, students mistakenly try to use the inverse key for subtraction; this will result in an error.

Negative key



Example: to calculate $15+ -3$, press the following keys:

15, [+], $[-]$, 3, [Enter]



Absolute value

To determine the absolute value of a number or calculation, press [Math], {Num}, {abs}, and enter the number or calculation. Remember to close the parenthesis before hitting [Enter]

Example: to determine the absolute value of $(-15+3)$ press the following keys:

[Math], {Num}, {abs}, $[-]$, 15, [+], 3, [)], [Enter]



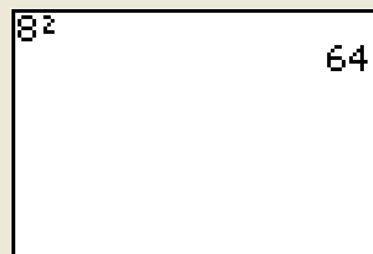
Powers and roots

The calculator has three keys which are used to calculate powers and roots.

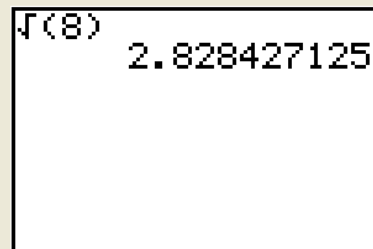
- $[x^2]$ is used to square a number
- $\langle\sqrt{\rangle}$ is used to determine the square root of a number (Note: the $\langle\sqrt{\rangle}$ automatically opens a set of parentheses.)
- $[^]$ is used to determine any power or root of a number

Examples:

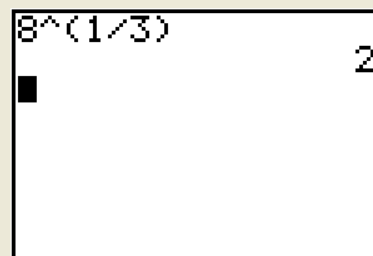
- to determine 8 squared, press the following keys: 8, $[x^2]$, [Enter]
- to determine the square root of 8, press the following keys: $[2^{nd}]$, $\langle\sqrt{\rangle}$, 8, $[)]$, [Enter]
- to determine the cube root of 8, press the following keys: 8, $[^]$, $[([)]$, 1, $[÷]$, 3, $[)]$, [Enter]



8² 64



$\sqrt{(8)}$ 2.828427125



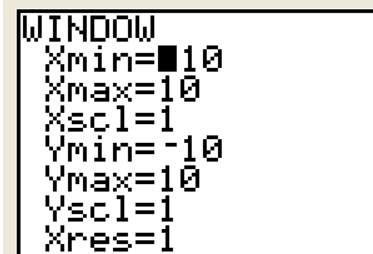
8^(1/3) 2

Adjusting the window for graphs

You may change the size, scale, and resolution of the graphing window in order to change what the calculator displays for a graph or boxplot.

The features you may change are:

- Xmin: the minimum value for x displayed
- Xmax: the maximum value for x displayed
- Xscl: the number of units between index marks on the x axis
- Ymin: the minimum value for y displayed
- Ymax: the maximum value for y displayed
- Yscl: the number of units between index marks on the y axis
- Xres: resolution of the graph. You may set this between 1 and 8. At 1, the calculator evaluates and graphs the equation at each pixel. At 8, the calculator evaluates and graphs every eighth pixel.



```
WINDOW
Xmin=10
Xmax=10
Xscl=1
Ymin=-10
Ymax=10
Yscl=1
Xres=1
```

Cautions:

- The Xscl or Yscl should be proportional to the difference between the min and max for each axis;

otherwise, the index marks may be too close together for effective use.

- Setting the Xres to 1 provides greater resolution, but it also slows down the graphing process.

To change the window settings, press [Window]. You may now use the [V] (down arrow) key to move down the list and make adjustments. When you are finished, press [2nd], <Quit>.

Probability and Statistics

Generating random integers

To generate one random integer, press [Math], {PRB}, {randInt()}, the lowest integer you want to generate, [,], the highest integer you want to generate, [)], [Enter]. (Note: the {RandInt()} function automatically opens a set of parentheses.)

Example: to generate one random integer between 15 and 23, press: [Math], {PRB}, {randInt()}, 15, [,], 23, [)], [Enter]

To generate multiple random integers, with replacement; place a comma after the highest integer value and enter the total number of integers you want generated. (Note: since the calculator generates random integers, with replacement, to generate a list of n distinct random integers you can increase the number of integers generated and select the first n distinct integers.

Example: to generate five distinct random integers between 15 and 23, press: [Math], {PRB}, {randInt()}, 15, [,], 23, [,], 8, [)], [Enter]

In this example, the calculator generated the number 23 twice so you would use 23, 16, 19, and 18; then press the [←] (left arrow) key to see the next integer, which is 21.

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

```
randInt(15,23)
                23
█
```

```
randInt(15,23,8)
(23 23 16 19 18...
```

```
randInt(15,23,8)
...23 16 19 18 21...
█
```

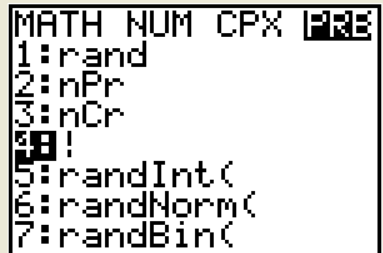

Factorials

To calculate a factorial, enter the number, press [Math], {PRB}, {!}, [Enter]

Example: to calculate 4!, press 4,[Math], {PRB}, {!}, [Enter]



4



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

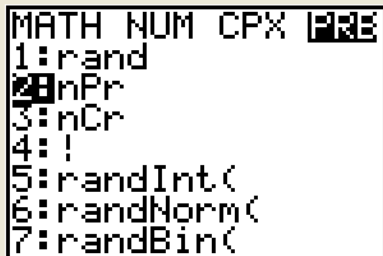


4! 24

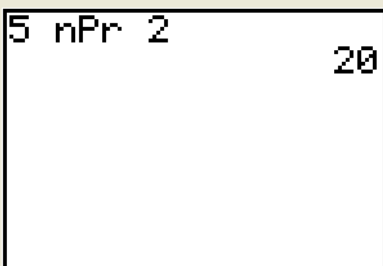
Permutations

To calculate the number of permutations of items taken a given number at a time, enter the number of items, [Math], {PRB}, {nPr}, number of items taken at a time [Enter].

Example: From 5 people, 2 will be selected for positions on a committee (1 as chair, the other as secretary). You are to determine the number of possible outcomes. To calculate, press 5, [Math], {PRB}, {nPr}, 2, [Enter]



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



5 nPr 2 20

Combinations

To calculate the number of combinations of items taken a given number at a time, enter the number of items, [Math], {PRB}, {nCr}, number of items taken at a time [Enter].

Example: From 5 people, 2 will be selected as members of a committee. You are to determine the number of possible outcomes. To calculate, press 5, [Math], {PRB}, {nCr}, 2, [Enter]

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

```
5 nCr 2
10
```

Entering data into a list

There are two ways to enter data into a list.

1. Enter the data directly from the home screen. To enter data this way, press [2nd], <{>, the value(s) to be stored separated by commas, <}>, [Sto>], list name, [Enter]
2. Enter the data using the Stat editor. To enter data this way, press [Stat], {Edit}, the appropriate list, the value(s) to be stored, [V] (down arrow) or [Enter] after each entry. Press [2nd], <Quit> when complete.

Examples:

- To enter the values 64, 69, 71, 71, and 73 into list 1, press: [2nd], <{>, 64 [,] 69 [,] 71 [,] 71 [,] 73 <}>, [Sto>], [2nd], <L1>, [Enter]
- To enter the values 125, 150, 138, 180, and 205 into list 2: press [Stat], {Edit}, {L2}, 125 [V] 150 [V] 138 [V] 180 [V] 205 [V] [2nd], <Quit>

```
{64,69,71,71,73}
→L1
{64 69 71 71 73}
```

```
-----
2001 CALC TESTS
1:Edit...
2:SortA(
3:SortD(
4:ClrList
5:SetUpEditor
```

L1	L2	L3	2
64	125		
69	150		
71	138		
71	180		
73	205		


L2(6) =			


Box plots

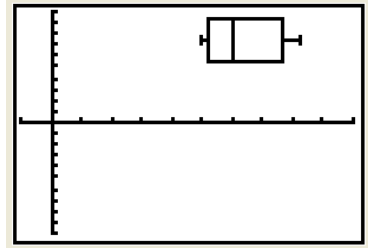
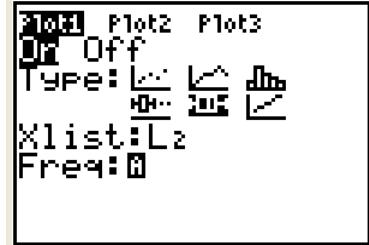
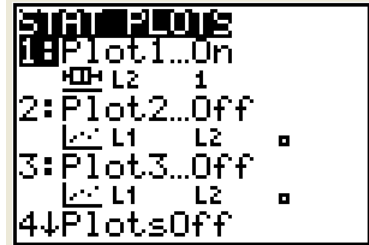
The box plot feature plots one-variable data. The values shown are the minimum (left whisker), Q1 (left side of box), median (line inside box), Q3 (right side of box), and maximum (right whisker).

More than one box plot may be viewed simultaneously. When this capability is used, the box plots are plotted with the first box plot at the top of the screen, second in the middle, and third at the bottom.

In order to view the box plots, you may need to adjust the Xmin and Xmax for the viewing window.


To create a box plot, press: [2nd], <Stat Plot>, plot to use, {On}, {, location of the data for Xlist, [Graph].


Example: To create a box plot using the data in L₂ as plot 1, press: [2nd], <Stat Plot>, {Plot 1}, {On}, {, [2nd], <L₂>, [Graph] (Note: for this example, the window is set for Xmin: -25, Xmax: 250, Xscl: 25. For information about adjusting the window, see page 6.)

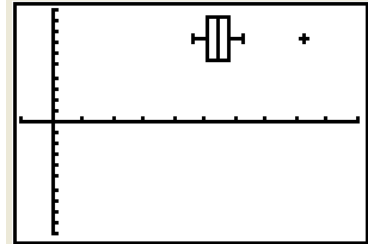
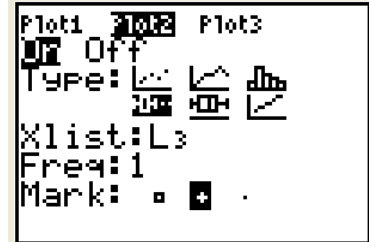


Modified box plots

The modified box plot is similar to the box plot. The difference is that the modified box plot individually plots outliers (data which is 1.5 times the interquartile range beyond the quartiles).

To create a modified box plot, press: [2nd], <Stat Plot>, plot to use, {On}, {, location of the data for Xlist, the mark to use for outliers, [Graph].

Example: To create a modified box plot using the data in L₃ as plot 2 with “+” marking the outlier(s), press: [2nd], <Stat Plot>, {Plot 2}, {On}, {, [2nd], <L₃>, {+}, [Graph] (Note: for this example, the window is set for Xmin: -25, Xmax: 250, Xscl: 25. For information about adjusting the window, see page 6.)



Scatter plots

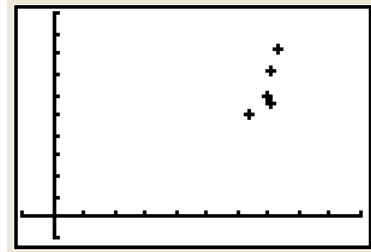
Scatter plots plot the data from two lists as coordinate pairs.

To create a scatter plot, press: [2nd], <Stat Plot>, plot to use, {On}, { $\underline{L_1}$ }, location of the data for Xlist, location of the data for Ylist, the mark to use for the coordinate pairs, [Graph].

Example: To create a scatter plot using the data in L_1 for X and L_2 for Y as Plot 1 with “+” marking the coordinate pairs, press: [2nd] <Stat Plot>, {Plot 1}, {On}, { $\underline{L_1}$ }, [2nd], < L_1 >, [2nd], < L_2 >, {+}, [Graph]. (Note: for this example, the window is set for Xmin: -10, Xmax: 100, Xscl: 10, Ymin: -25, Ymax: 250, Yscl: 25. For information about adjusting the window, see page 6.)

```
STAT PLOTS
1:Plot1...On
  L1 L2 +
2:Plot2...Off
  L1 L2 +
3:Plot3...Off
  L1 L2 □
4↓PlotsOff
```

```
Plot1 Plot2 Plot3
Off Off
Type: [Scatter] [Line] [Bar]
      [OH] [OH] [OH]
Xlist:L1
Ylist:L2
Mark: □ ■ .
```



xyLine

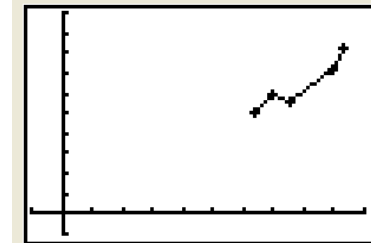
xyLine is a scatter plot in which the data points are plotted and connected in the order they appear on the lists. If the data is not already sequenced, you may need to use the SortA feature of the calculator (see page 25.)

To create an xyline, press: [2nd], <Stat Plot>, plot to use, {On}, { $\underline{L_1}$ }, location of the data for Xlist, location of the data for Ylist, the mark to use for the coordinate pairs.

Example: To create an xyline using the data in L_1 for X and L_2 for Y as Plot 1 with “+” marking the coordinate pairs, press: [2nd] <Stat Plot>, {Plot 1}, {On}, { $\underline{L_1}$ }, [2nd], < L_1 >, [2nd], < L_2 >, {+}, [Graph]. (Note: for this example, the window is set for Xmin: -10, Xmax: 100, Xscl: 10, Ymin: -25, Ymax: 250, Yscl: 25. For information about adjusting the window, see page 6.)


```
STAT PLOTS
1:Plot1...On
  L1 L2 +
2:Plot2...Off
  L1 L2 +
3:Plot3...Off
  L1 L2 □
4↓PlotsOff
```


```
Plot1 Plot2 Plot3
Off Off
Type: [Line] [Scatter] [Bar]
      [OH] [OH] [OH]
Xlist:L1
Ylist:L2
Mark: □ ■ .
```



Histograms

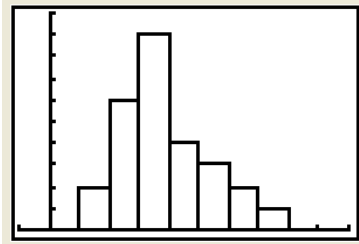
The histogram plots one-variable data. The Xscl value (located on the window screen) determines the width of each bar of the histogram.

To create a histogram, press: [2nd], <Stat Plot>, plot to use, {On}, {}, location of the data for Xlist, [Graph].

Example: To create a histogram using the data in L₄ as Plot 1, press: [2nd], <Stat Plot>, {Plot 1}, {On}, {}, [2nd], <L₄>, [Graph].


```
STAT PLOTS
1:Plot1...On
  ▯ L1 1
2:Plot2...Off
  ▯ L1 L2 +
3:Plot3...Off
  ▯ L1 L2 □
4↓PlotsOff
```


```
Plot1 Plot2 Plot3
Off Off
Type: ▯ ▯ ▯
      ▯ ▯ ▯
Xlist:L4
Freq:1
```



Normal Probability Plots

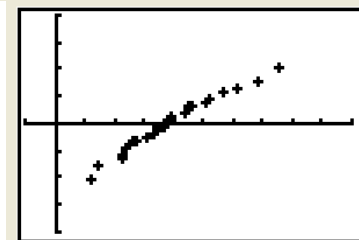
The normal probability plot plots each observation X in a list versus the corresponding quartile of the standard normal distribution. If the plotted points appear to lie close to a straight line, then the plot indicates that the data is normal.

To create a normal probability plot, press: [2nd], <Stat Plot>, plot to use, {On}, {}, location of data for Data List, {X}, the mark to use to plot data, [Graph].

Example: To create a normal probability plot using the data in L₄ as Plot 1, press: [2nd], <Stat Plot>, {Plot 1}, {On}, {}, [2nd], <L₄>, {X}, {+}, [Graph]. (Note: for this example, the window is set for Xmin: -10, Xmax: 100, Xscl: 10, Ymin: -4, Ymax: 4, Yscl: 1. For information about adjusting the window, see page 6.)

```
STAT PLOTS
1:Plot1...On
  ▯ L4 xAxis +
2:Plot2...Off
  ▯ L1 L2 +
3:Plot3...Off
  ▯ L1 L2 □
4↓PlotsOff
```

```
Plot1 Plot2 Plot3
Off Off
Type: ▯ ▯ ▯
      ▯ ▯ ▯
Data List:L4
Data Axis:Y
Mark: ▯ ■ .
```



1 Variable Statistics

The 1-variable statistics function analyzes data with one variable. This function may be executed two ways.

1. From a single list. This procedure is used if all of the data values are entered into a single list, with values being repeated if the value occurs more than once. Press: [Stat], {Calc}, {1-Var Stats}, location of data, [Enter].
2. From two lists. This procedure is used if one list contains the values and a second list contains the frequency of occurrence for each value. Press: [Stat], {Calc}, {1-Var Stats}, location of values, [,], location of frequencies, [Enter].

Examples:

- To determine the 1 variable statistics for the data in L_3 , press: [Stat], {Calc}, {1-Var Stats}, [2^{nd}], $\langle L_3 \rangle$, [Enter].
- To determine the 1 variable statistics for the data in L_3 , with L_5 being the frequency of each occurrence, press: [Stat], {Calc}, {1-Var Stats}, [2^{nd}], $\langle L_3 \rangle$, [,], [2^{nd}], $\langle L_5 \rangle$, [Enter].

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

```
1-Var Stats L3
```

```
1-Var Stats
x̄=22.30769231
Σx=290
Σx²=7026
Sx=6.811566332
σx=6.544341248
↓n=13
```

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

```
1-Var Stats L3,L5
```

```
1-Var Stats
x̄=21.93548387
Σx=680
Σx²=15800
Sx=5.427924612
σx=5.339659793
↓n=31
```

2 variable statistics

The 2-variable statistics function analyzes paired data. Like the 1-variable function, this function may be executed two ways.

1. From two lists. This procedure uses one list for the independent variable and one list for the dependent variable. Press: [Stat], {Calc}, {2-Var Stats}, location of data for independent variable, [,], location of data for dependent variable, [Enter].
2. From three lists. This procedure uses one list for the independent variable, one for the dependent variable, and one for the frequency of occurrence of each data pair. Press: [Stat], {Calc}, {2-Var Stats}, location of data for independent variable, [,], location of data for dependent variable, [,], location of data for frequency of data pairs, [Enter].

Examples:

- To determine 2-variable statistics for the independent variable data in L_1 and dependent variable data in L_2 , press: [Stat], {Calc}, {2Var Stats}, [2^{nd}], < L_1 >, [,], [2^{nd}], < L_2 >, [Enter]
- To determine 2-variable statistics for the independent variable data in L_1 , dependent variable data in L_2 , and frequency data in L_3 , press: [Stat], {Calc}, {2Var Stats}, [2^{nd}], < L_1 >, [,], [2^{nd}], < L_2 >, [,], [2^{nd}], < L_3 >, [Enter]

```
EDIT [2nd] [MODE] TESTS
1:1-Var Stats
2:2-Var Stats
3:Med-Med
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7↓QuartReg
```

```
2-Var Stats L1,L
2
```

```
2-Var Stats
x̄=78
Σx=390
Σx²=31052
Sx=12.56980509
σx=11.24277546
↓n=5
```

```
-----
EDIT [2nd] [MODE] TESTS
1:1-Var Stats
2:2-Var Stats
3:Med-Med
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7↓QuartReg
```

```
2-Var Stats L1,L
2,L3
```

```
2-Var Stats
x̄=78.42857143
Σx=1098
Σx²=87604
Sx=10.7038044
σx=10.314444
↓n=14
```

Correlation and regression

The linear regression function uses least squares to calculate the linear equation ($y=a+bx$) which best fits the data. It will display **a** (y intercept) and **b** (slope) when DiagnosticOn is set. It also displays the values for r^2 and r .

To set DiagnosticON, press: [2nd], <Catalog>, {DiagnosticOn}, [Enter]. (Note: you must press [Enter] once to select the DiagnosticOn function and a second time to execute the function.)

This function may be executed two ways.

1. From two lists. This procedure uses one list for the independent variable and one list for the dependent variable. Press: [Stat], {Calc}, {LinReg (a+bx)}, location of data for independent variable, [,], location of data for dependent variable, [Enter].
2. From three lists. This procedure uses one list for the independent variable, one for the dependent variable, and one for the frequency of occurrence of each data pair. Press: [Stat], {Calc}, {LinReg (a+bx)}, location of data for independent variable, [,], location of data for dependent variable, [,], location of data for frequency of data pairs, [Enter].

Example: To perform a linear regression for the independent variable data in L_1 and dependent variable data in L_2 , press: [Stat], {Calc}, {LinReg (a+bx)}, [2nd], < L_1 >, [,], [2nd], < L_2 >, [Enter]

```
CATALOG [2]
▸abs(
  and
  angle(
  ANOVA(
  Ans
  Archive
  Asm(
```

```
CATALOG [2]
  Degree
  DelVar
  DependAsk
  DependAuto
  det(
  DiagnosticOff
  ▸DiagnosticOn
```

```
DiagnosticOn Done
█
```

```
-----
EDIT [2] TESTS
4▸LinReg(ax+b)
5: QuadReg
6: CubicReg
7: QuartReg
8: LinReg(a+bx)
9: LnReg
▸ExpReg
```

```
LinReg(a+bx) L1,
L2
```

```
LinReg
y=a+bx
a=-30.58670886
b=2.438291139
r2=.887604329
r=.9421275545
█
```


Graphing the regression line

There are two methods to graph the regression line.

1. Direct the calculator to input the equation of the regression line into a specified Y variable while calculating the regression line. To do this, enter the data to calculate the regression line, then press: [,], [Vars], {Y-Vars}, {Function}, and Y variable name.
2. Direct the calculator to graph the regression line after the line has been calculated. To do this, press: [y=], Y variable to use for the line, [Vars], {Statistics}, {Eq}, {RegEq} , [Graph]

Examples:

- To perform a linear regression and show the graph for the independent variable data in L_1 and dependent variable data in L_2 using Y_2 as the variable, press: [Stat], {Calc}, {LinReg (a+bx)}, [2^{nd}], < L_1 >, [,], [2^{nd}], < L_2 >, [Vars], {Y-Vars}, {Function}, { Y_2 }, [Enter]. After the calculator has computed the line, check [y=] to insure only the desired variable is selected for graphing, then press: [Graph].

```
EDIT [2nd] [DEL] TESTS
3↑Med-Med
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7:QuartReg
8:LinReg(a+bx)
9↓LnReg
```

```
LinReg(a+bx) L1,
L2, [ ]
```

```
VARSEL [2nd] [VARS]
1:Function...
2:Parametric...
3:Polar...
4:On/Off...
```

```
Y-VARS [2nd] [VARS]
1:Y1
2:Y2
3:Y3
4:Y4
5:Y5
6:Y6
7↓Y7
```

```
LinReg(a+bx) L1,
L2, Y2 [ ]
```

```
LinReg
y=a+bx
a=-30.58670886
b=2.438291139
r2=.887604329
r=.9421275545
```

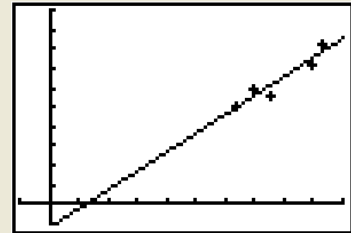
Note: in this example the Plot 1 is also selected. This will show the data from L₁ and L₂ as a scatter plot on the same screen as the graph of the regression line.

- To graph a regression line which has already been calculated using Y₁ as the variable, press: [y=], {Y₁}, [Vars], {Statistics}, {Eq}, {RegEq} , [Graph]

```

Plot1 Plot2 Plot3
\Y1=
\Y2= -30.58670886
076+2.4382911392
405X
\Y3=
\Y4=
\Y5=

```



```

Plot1 Plot2 Plot3
\Y1=
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=

```

```

VARX Y-VARS
1:Window...
2:Zoom...
3:GDB...
4:Picture...
5:Statistics...
6:Table...
7:String...

```

```

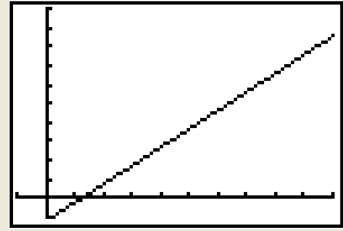
XY Σ [EQ] TEST PTS
[RegEQ]
2:a
3:b
4:c
5:d
6:e
7↓r

```

```

Plot1 Plot2 Plot3
\Y1= -30.58670886
076+2.4382911392
405X
\Y2=
\Y3=
\Y4=
\Y5=

```



Confidence intervals for proportions

This function calculates the confidence interval for an unknown proportion of successes. To use this function, press: [Stat], {Tests}, {1—PropZInt}, number of successes observed, sample size, confidence level, [Enter].

Example: To calculate the confidence interval based on 73 successes from a sample size of 92 with a .95 confidence level, press: [Stat], {tests}, {1—PropZInt}, 73, 92, .95, [Enter]. (Note: you need to highlight {calculate} before pressing [Enter]).

```
EDIT CALC TESTS
7↑ZInterval...
8:TInterval...
9:2-SampZInt...
0:2-SampTInt...
1-PropZInt...
6:2-PropZInt...
C↓X²-Test...
```

```
1-PropZInt
x:73
n:92
C-Level:.95
Calculate
```

```
1-PropZInt
(.71076,.8762)
p̂=.7934782609
n=92
```

Hypothesis testing for proportions

This function calculates the z-score, P-value, and proportion for the sample population. It can also graph the P-value on a normal curve. To use this function, press: [Stats], {Tests}, {1—PropZTest}, null hypothesis proportion, number of successes observed, sample size, type of alternate hypothesis, and information to display.

Examples:

- To perform the hypothesis test with a null hypothesis of .75, observed successes of 63, sample size of 92, and a two-tailed test, press: [Stats], {Tests}, {1—PropZTest}, .75, 63, 92, [Enter] (Note: You must highlight {Calculate} before pressing [Enter])

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

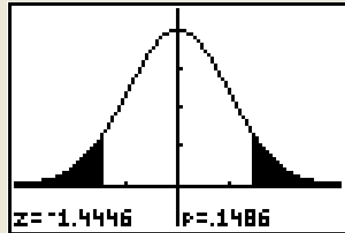
```
1-PropZTest
P0:.75
x:63
n:92
PROF P0 <P0 >P0
Calculate Draw
```

- To graph the same data, the procedures are the same, except that you must highlight {Draw} before pressing [Enter].

```

1-PropZTest
PROF#.75
z=-1.444630237
P=.1485618591
P̂=.6847826087
n=92

```



Confidence intervals for means, if the population standard deviation is known

This function calculates the confidence interval for an unknown population mean when the population standard deviation is known. There are two methods of performing this calculation. You should select the best option based on the known information.

- To determine the confidence interval from a list of data, press: [Stat], {Tests}, {ZInterval}, {Data}, population standard deviation, location of data, confidence level, [Enter].
- To determine the confidence interval when you already know the sample size and mean, press: [Stat], {tests}, ZInterval}, {Stats}, population standard deviation, sample mean, sample size, confidence level, [Enter].

Examples:

- To determine the confidence interval from the data in L₂ of a population with a standard deviation of 7.7 to a confidence level of .95, press: [Stat], {Tests}, {ZInterval}, {Data}, 7.7, L₂, .95, [Enter]. (Note: You must highlight {Calculate} before pressing [Enter].)

```

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

```

```

ZInterval
Inpt: DATA Stats
σ:7.7
List:L2
Freq:1
C-Level:.95
Calculate

```

```

ZInterval
(89.942,95.978)
x̄=92.96
Sx=7.812809994
n=25

```

- To determine the confidence interval for a population with a standard deviation of 8 based on a sample of 32 with a mean of 57.3 to a confidence level of .95, press: [Stat], {ZInterval}, {Stats}, 8, 57.3, 32, .95, [Enter]. (Note: you must highlight {Calculate} before pressing [Enter].

```

EDIT CALC TESTS
3↑2-SampZTest...
4:2-SampTTest...
5:1-PropZTest...
6:2-PropZTest...
7:ZInterval...
8:TInterval...
9↓2-SampZInt...

```

```

ZInterval
Inpt:Data Stats
σ:8
x:57.3
n:32
C-Level: .95
Calculate

```

```

ZInterval
(54.528,60.072)
x=57.3
n=32

```

Confidence intervals for means if the population standard deviation is unknown

This function calculates the confidence interval for an unknown population mean when the population standard deviation is unknown. There are two methods of performing this calculation. You should select the best option based on the known information.

- To determine the confidence interval from a list of data, press: [Stat], {Tests}, {TInterval}, {Data}, location of data, confidence level, [Enter].
- To determine the confidence interval when you already know the sample size, mean, and standard deviation; press: [Stat], {tests}, TInterval}, {Stats}, sample mean, sample standard deviation, sample size, confidence level, [Enter].

Examples

- To determine the confidence interval from the data in L₂ of a population to a confidence level of .95, press: [Stat], {Tests}, {TInterval}, {Data}, L₂, .95, [Enter]. (Note: You must highlight {Calculate} before pressing [Enter].

```

EDIT CALC TESTS
2↑T-Test...
3:2-SampZTest...
4:2-SampTTest...
5:1-PropZTest...
6:2-PropZTest...
7:ZInterval...
8:TInterval...

```

```

TInterval
Inpt:DATA Stats
List:L2
Freq:1
C-Level: .95
Calculate

```

```

TInterval
(89.735,96.185)
x=92.96
Sx=7.812809994
n=25

```

- To determine the confidence interval for a population based on a sample of 32 with a mean of 57.3 and a standard deviation of 7.2 to a confidence level of .95, press: [Stat], {TInterval}, {Stats}, 57.3, 7.2, 32, .95, [Enter]. (Note: you must highlight {Calculate} before pressing [Enter].)

```

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

```

```

TInterval
Inpt:Data STATS
x:57.3
Sx:7.2
n:32
C-Level: .95
Calculate

```

```

TInterval
(54.704, 59.896)
x=57.3
Sx=7.2
n=32

```

Hypothesis testing for means if the population standard deviation is known

The Z-Test function of the calculator performs a hypothesis test for an unknown population mean when the population standard deviation is known. There are two methods for performing this function. You should select the method based on the known information.

- To perform a hypothesis test from data in a list, press: [Stat], {Tests}, {Z-Test}, {Data}, hypothesized value of the population mean, population standard deviation, location of data, type of test (1-tailed or 2-tailed), and output option (calculate or draw).
- To perform a hypothesis test using data you intend to enter into the calculator, press: [Stat], {tests}, {Z-Test}, {Stats}, hypothesized value of the population mean, population standard deviation, sample mean, sample size, type of test (1-tailed or 2-tailed), and output option (calculate or draw).

Examples:

- To perform a hypothesis test that the population mean is 89 with a known standard deviation of 5.6 using the data in L_2 and a 2-tailed test, press:

```

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

```

```

Z-Test
Inpt: STATS Stats
μ₀:89
σ:5.6
List:L₂
Freq: 0
μ: ≠ μ₀ < μ₀ > μ₀
Calculate Draw

```

```

Z-Test
μ≠89
z=3.535714286
P=4.0675767E-4
x=92.96
Sx=7.812809994
n=25

```

[Stat], {Tests}, {Z-Test}, {Data}, 89, 5.6, L₂, { $\mu \neq \mu_0$ }, [Enter]. (Note: you need to have {calculate} highlighted when you press [Enter].)

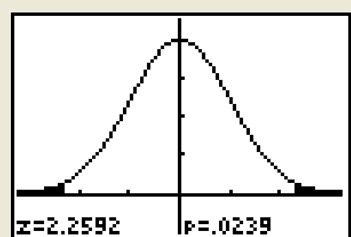
- To perform a hypothesis test that the population mean is 78 with a known standard deviation of 7.2 using a sample with mean 82.2 and size 15, conducting a 2-tailed test and graphing the results, press: [Stat], {Tests}, {Z-Test}, {Stats}, 78, 7.2, 82.2, 15, { $\mu \neq \mu_0$ }, [Enter]. (Note: you need to have {Draw} highlighted when you press [Enter].)

```

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

```

Z-Test
Inpt:Data Stats
μ₀:78
σ:7.2
x̄:82.2
n:15
μ:≠ <μ₀ >μ₀
Calculate Draw
  
```



Hypothesis testing for means if the population standard deviation is unknown

The T-Test function of the calculator performs a hypothesis test for an unknown population mean when the population standard deviation is unknown. There are two methods for performing this function. You should select the method based on the known information.

- To perform a hypothesis test from data in a list, press: [Stat], {Tests}, {T-Test}, {Data}, hypothesized value of the population mean, location of data, type of test (1-tailed or 2-tailed), and output option (calculate or draw).
- To perform a hypothesis test using data you intend to enter into the calculator, press: [Stat], {tests}, {T-Test}, {Stats}, hypothesized value of the population mean, sample mean, sample standard deviation, sample size, type of test (1-tailed or 2-tailed), and output option (calculate or draw).

Examples:

- To perform a hypothesis test that the population mean is 89 using the data in L₂ and a 2-tailed test, press: [Stat], {Tests}, {T-Test}, {Data}, 89, L₂, { $\mu \neq \mu_0$ }, [Enter]. (Note: you need to have {calculate} highlighted when you press [Enter].)

```

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

```

T-Test
Inpt: DATA Stats
μ₀:89
List:L₂
Freq:0
μ:≠ <μ₀ >μ₀
Calculate Draw
  
```

```

T-Test
μ≠89
t=2.534299441
P=.0182056038
x̄=92.96
Sx=7.812809994
n=25
  
```

- To perform a hypothesis test that the population mean is 78 using a sample with mean 82.2, standard deviation 6.5, and size 15, conducting a 2-tailed test and graphing the results, press: [Stat], {Tests}, {T-Test}, {Stats}, 78, 82.2, 6.5, 15, $\mu \neq \mu_0$, [Enter]. (Note: you need to have {Draw} highlighted when you press [Enter].)

```

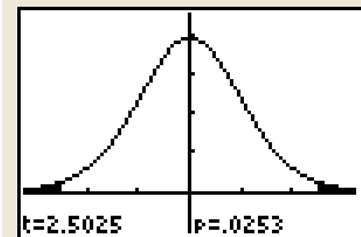
EDIT CALC TESTS
1: Z-Test...
2: T-Test...
3: 2-SampZTest...
4: 2-SampTTest...
5: 1-PropZTest...
6: 2-PropZTest...
7: Interval...

```

```

T-Test
Inpt: Data STATS
μ₀: 78
x̄: 82.2
Sx: 6.5
n: 15
μ: ≠ <μ₀ >μ₀
Calculate DRAW

```



Chi square

To perform a Chi square test, you need to have the observed and expected data in matrix form. To enter data into a matrix on the calculator, press: [2nd], <Matrix>, {Edit}, the name of the matrix, number of rows, number of columns, and matrix data.

Example of entering data into a matrix:

- To create a 3X2 Matrix named A with the values 275, 297, and 342 in column 1 and the values 184, 170, and 211 in column 2, press: [2nd], <Matrix>, {Edit}, {A}, 3, 2, 275, 297, 342, 184, 170, and 211. You may now exit the matrix.

```

NAMES MATH EDIT
1: [A] 3x2
2: [B] 3x2
3: [C]
4: [D]
5: [E]
6: [F]
7: [G]

```

```

MATRIX[A] 3 x2
[ 275 184 ]
[ 297 170 ]
[ 342 211 ]
3, 2=211

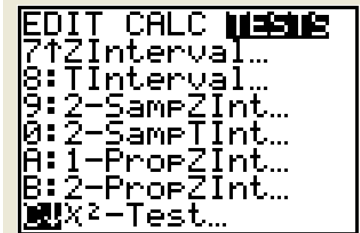
```


Once the data is in matrix format, you may perform a Chi square test. Press: [Stat], {Tests}, { χ^2 -Test...}, name of matrix with observed data, name of matrix with expected data, output type (calculate or draw), [Enter].

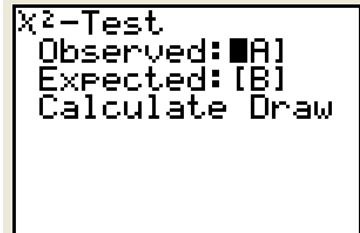
(Notes:

1. The defaults for the system are matrix A for observed values and matrix B for expected values.
2. To change to a different matrix name, press: [2nd], <Matrix>, name of desired matrix.
3. You must highlight either {calculate} or {Draw} before pressing [Enter].)

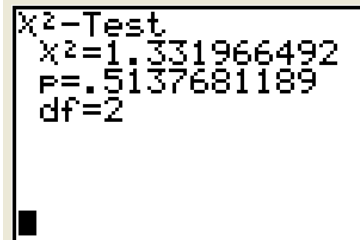
Example of calculating Chi Square with the observed data in matrix A and the expected data in Matrix B. Press: [Stat], {Tests}, { χ^2 -Test...}, [Enter].



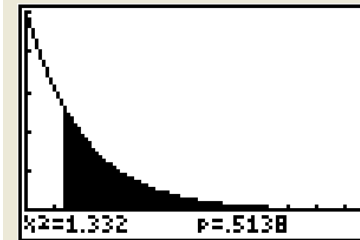
```
EDIT CALC TESTS
7:ZInterval...
8:TInterval...
9:2-SampZInt...
0:2-SampTInt...
A:1-PropZInt...
B:2-PropZInt...
 $\chi^2$ -Test...
```



```
 $\chi^2$ -Test
Observed: [A]
Expected: [B]
Calculate Draw
```



```
 $\chi^2$ -Test
 $\chi^2=1.331966492$ 
 $P=.5137681189$ 
df=2
```



<p>Other</p>	
<p>Sorting lists</p> <p>Lists may be sorted in either ascending or descending order.</p> <ol style="list-style-type: none"> 1. To sort a list in ascending order, press: [Stat], {Edit}, {SortA()}, list name, [)], [Enter]. 2. To sort a list in descending order, press: [Stat], {edit}, {SortD()}, list name, [)], [Enter]. <p>Example: to sort L_1 in ascending order, press: [Stat], {Edit}, {SortA()}, [2^{nd}], <L_1>, [)], [Enter].</p>	