

# Instructions

*Ti-Inspire for statistics*

## General Introduction

### ***Keyboard shortcuts***

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#### **Editing Text**

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cut		
-----	---	---

copy		
------	---	---

paste		
-------	--	--

undo		
------	---	---

redo		
------	---	---

save current document		
-----------------------	---	---

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#### **Modifying Display**

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increase contrast		
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decrease contrast		
-------------------	---	---

power off		
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## General instructions

Press the Home Button



to go to

home page

### **Pages you will use the most**

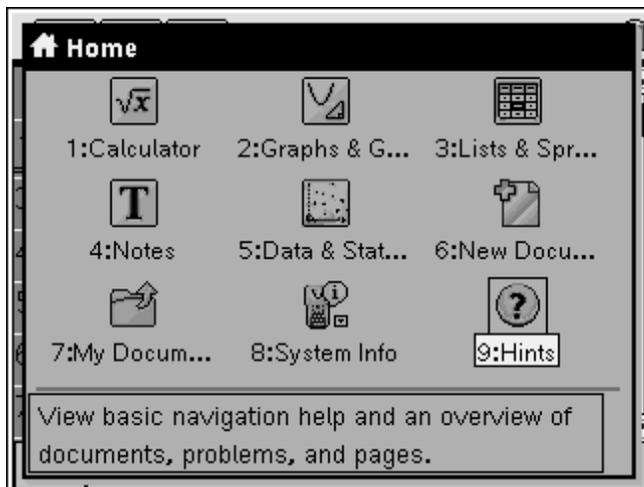
#1 is a page for doing calculations such as adding number

#2 is graphing

#3 has columns for data entry(you will use this a lot)

#4 is notes

#5 is for opening saved files



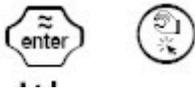
Use the



to navigate among the choices. A brief description of

each appears at the bottom of the page

To select an option press  or  or the number



**Important** If you try to divide numbers TI-Inspire will give you a fraction since a decimal is only an approximation <sup>1</sup>

You can force a decimal approximation in a result:

- By pressing   instead of  to evaluate the expression.

Deleting

Items from memory

Choose   use  or  to select document and then hit clear




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<sup>1</sup>Which I am more than happy to live with

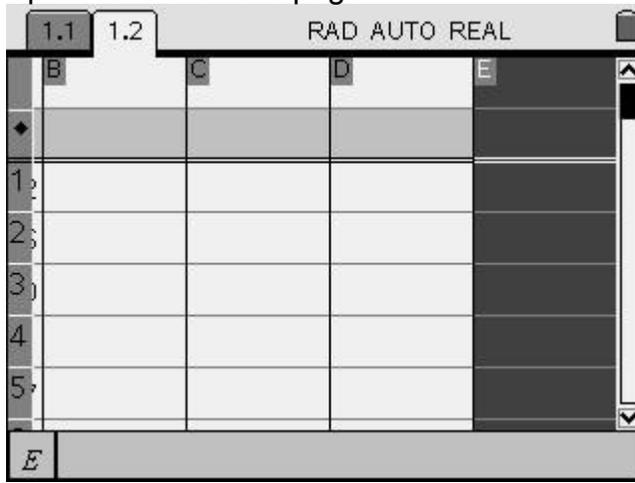
## Finding Mean, Median and Mode

**Step 1) Open a list so you can enter you data**

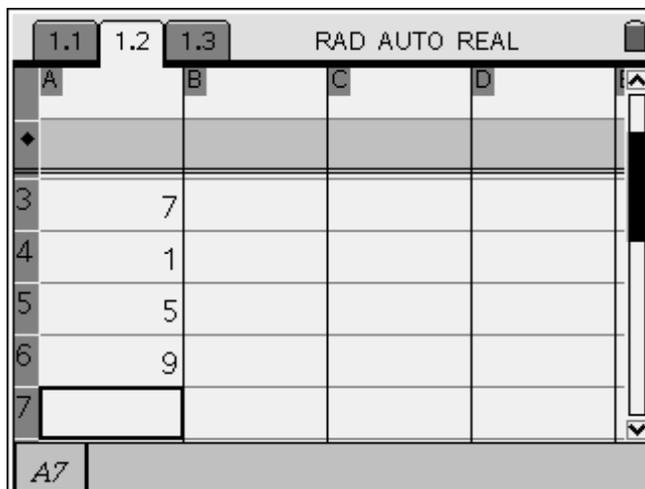
Press



to create a new Lists & Spreadsheet page. A new document opens with Lists & Spreadsheet on the page.



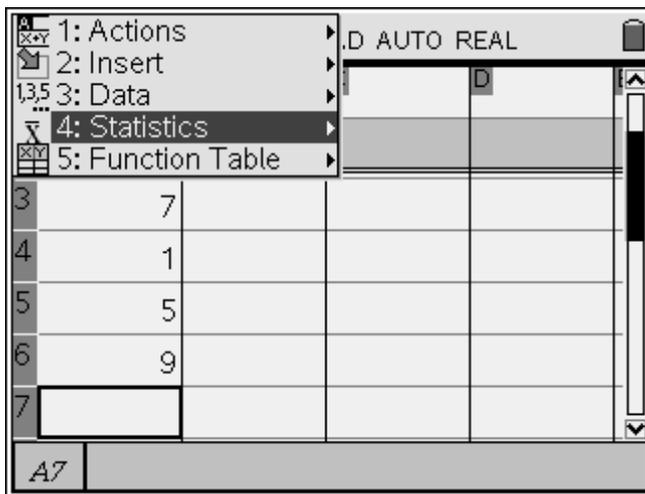
Enter your data in a column ( could use any column)



Click [Menu]



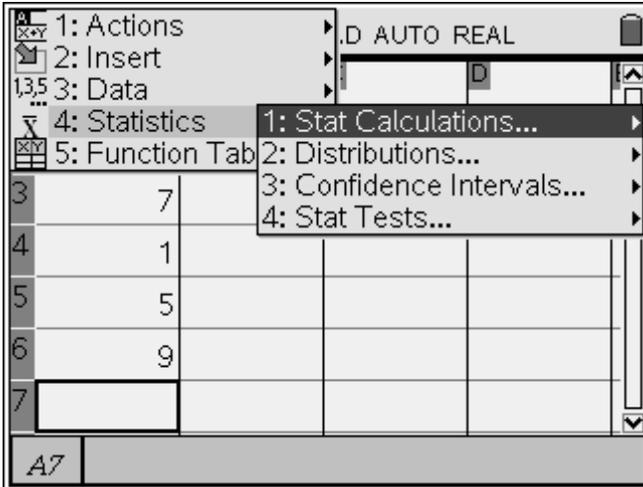
Choose "4: Statistics"



Use arrow on navigator button to move left

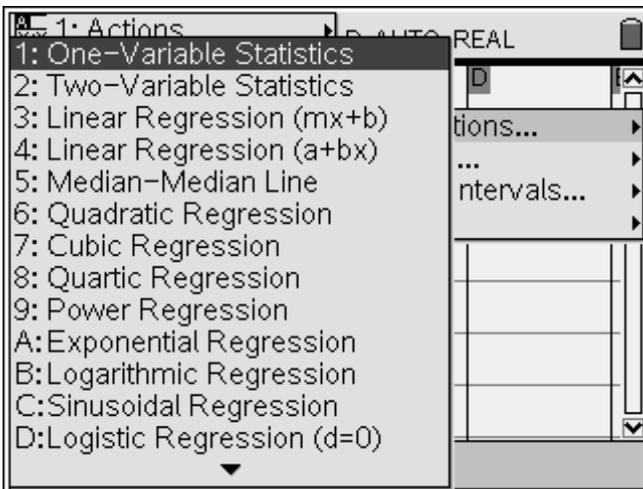


Choose "1: Stat Calculation"



Use navigator arrow again

Choose "1: One-Variable Statistics"



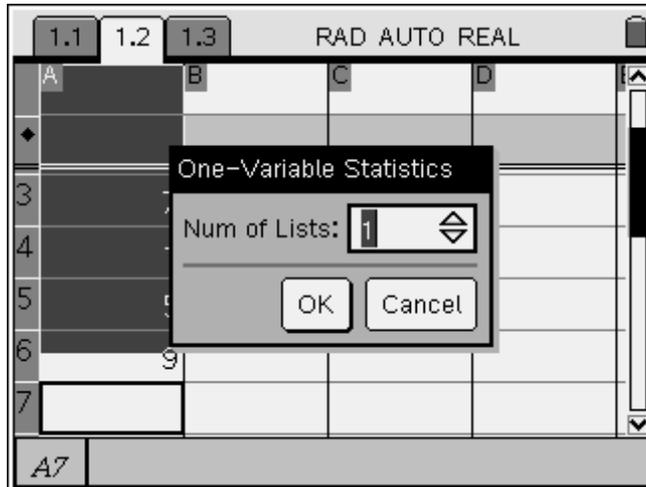
Choosing is done by either using the [Enter] button



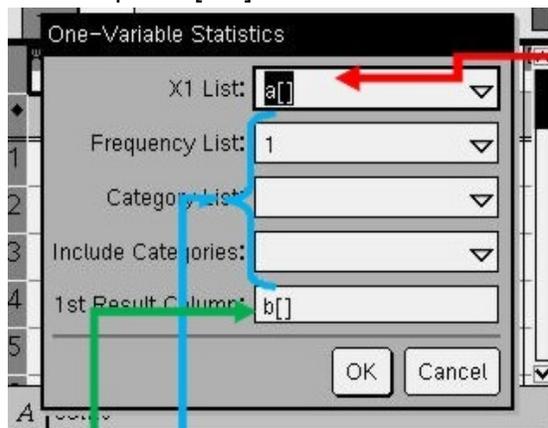
Or the hand in the center of the navigator button



Step 2) leave "num of lists" on "1" and



and then press [OK]



This tells the TI where the data is you want the mean of. If its in *b* or some other column change letter. You may also use the name of the column "*colas*"

Leave the next three spaces alone

This one tells the TI in which column to put the answer. **Always** use an empty column because it will write over whatever is in the column.

Usually the TI tells you the empty one.

If you are recalculating and want to wipe out the old then you can do that too.

Press [OK]

RAD AUTO REAL			
1.1	1.2	1.3	
A	B	C	D
		=OneVar('	
1	5 Title	One-Var...	
2	6 $\bar{x}$	5.5	
3	7 $\Sigma x$	22.	
4	1 $\Sigma x^2$	132.	
5	5 $s_x := s_n - \dots$	1.91485	
C1 = "One-Variable Statistics"			

Use navigator button to navigate up and down results

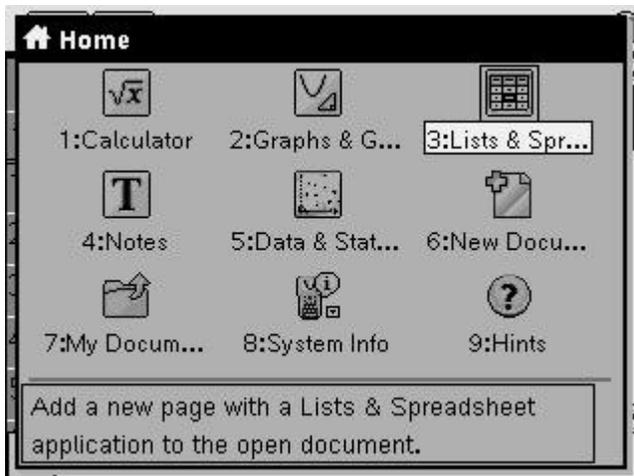
$\bar{x}$  = mean (pronounced "X bar")

Scroll down for median and other data

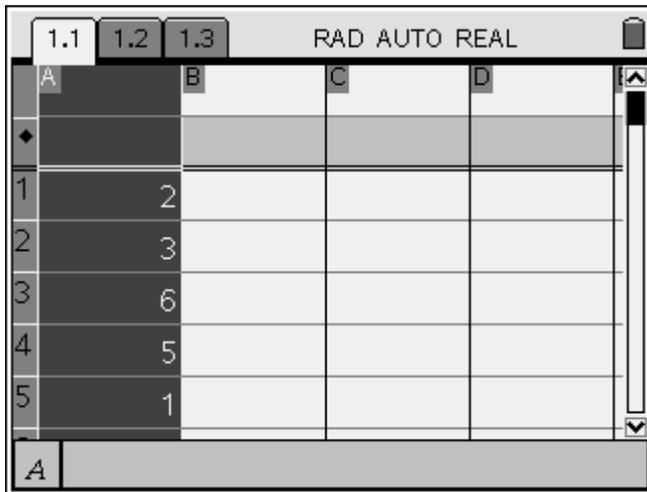
### **Clearing column and/ or rows of Data**

#### **First columns**

Use  Go to



use center navigator button to go up to the top of the column which will cause it to highlight



when column highlights

hit  and the column will be empty.

**Second rows:** Again use the center navigator to go all the way to the left. When the row blackens hit the [Clear] button to empty the row

**Several rows or several columns at the same time:** Drag to select additional rows or columns

**Copying rows or columns**

Use the same procedure as above to highlight the row or column. When it is highlighted press  C to copy a column or row and  V to paste it.

**Constructing a Box plot**

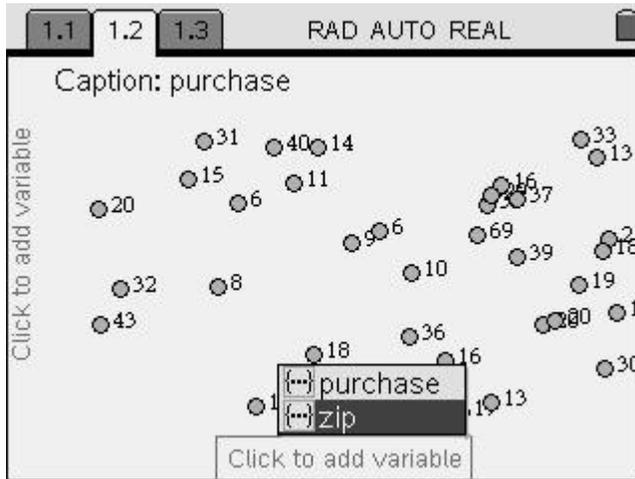


to get a graph screen

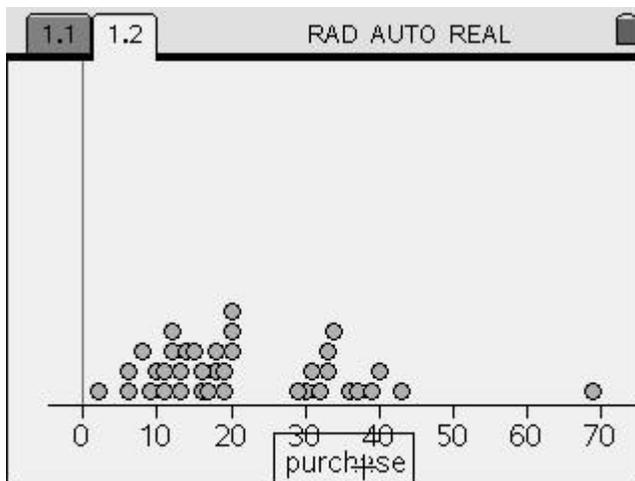


Click the hand button  in the center of the navigator button. The name of your

column of data will appear. If you have several columns of data they will all appear.



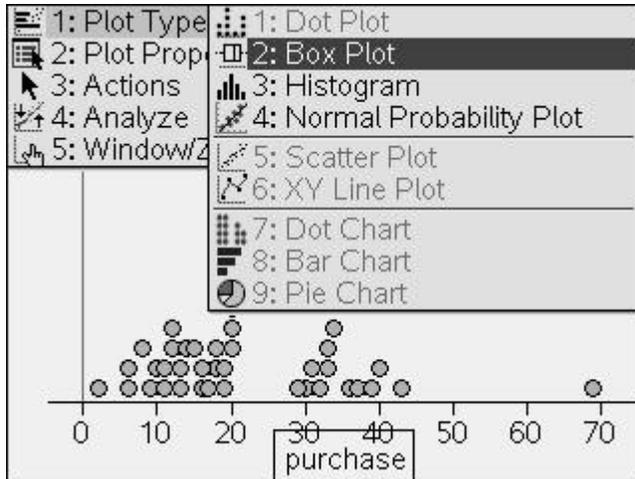
Use the arrow to get to the correct one which will be highlighted and click the hand.



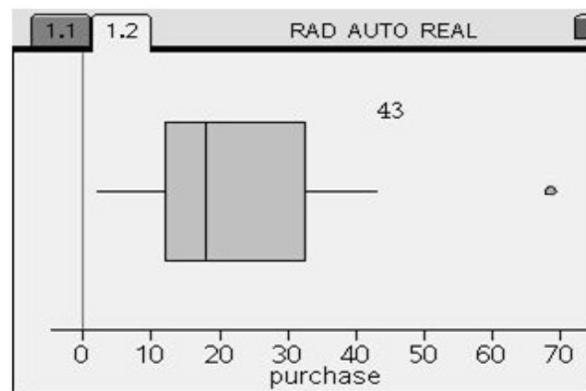
Press 

Then choose **1: plot Type**

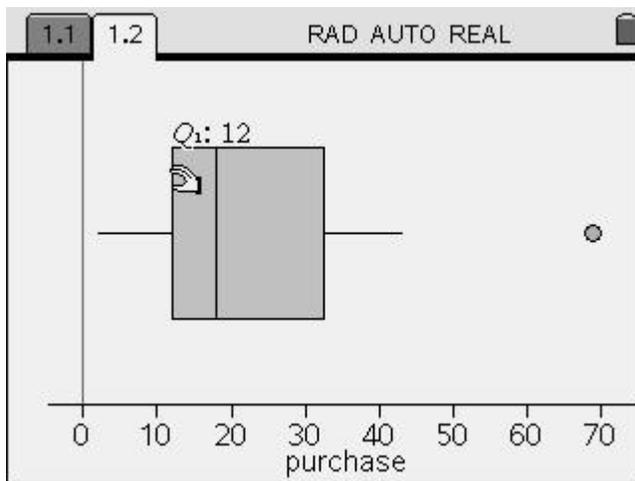
Then **2: Box Plot**



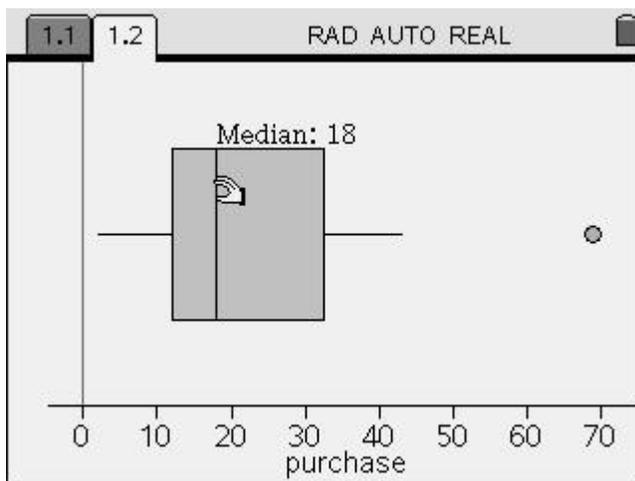
the number that appears is the where the outliers start. In this case "43 " is not an outlier but anything greater is



Move the hand to the bottom of the box and it will give you Q1



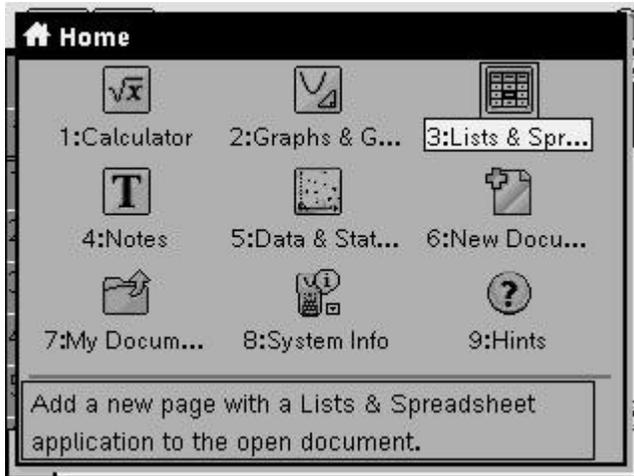
Moving it to the middle line gives you the median, etc.



## How to find Standard Deviation

Press Home

3: List & spread sheet

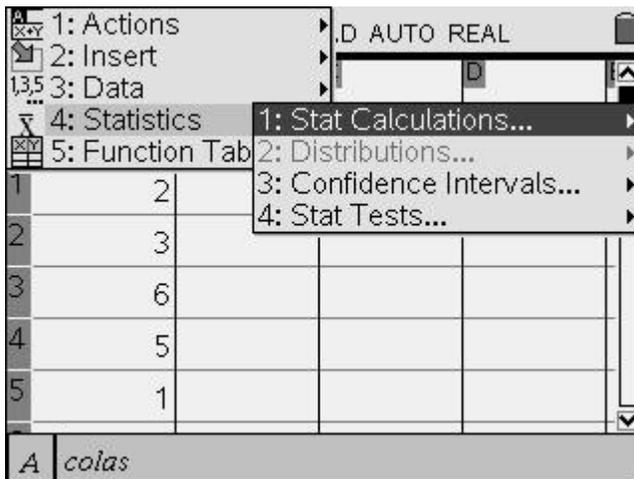


Enter data and give column name if you wish

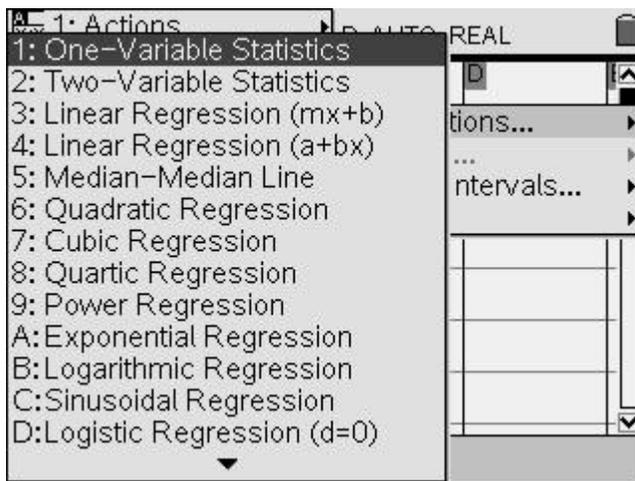
Press 

4: Statistics

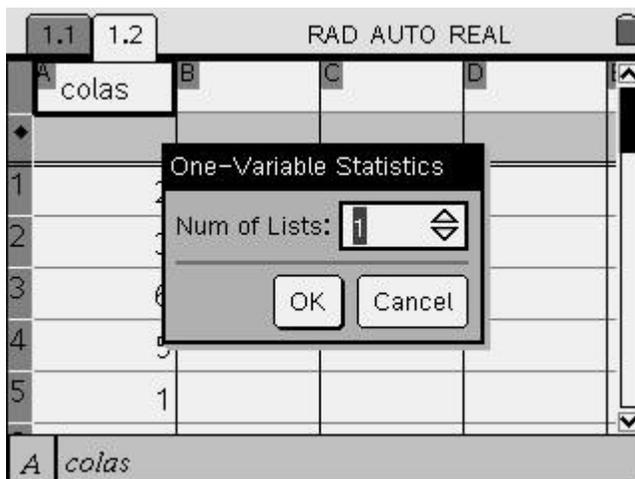
1: Stat Calculations



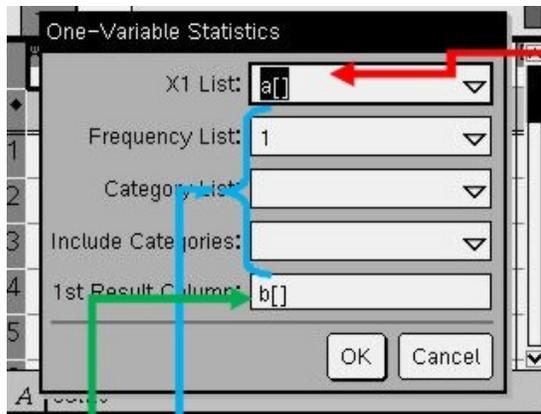
## 1:One Variable Statistics

**Press center button**

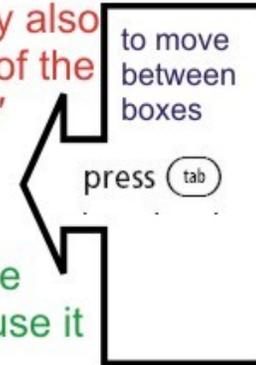
Leave "num of lists" on "1"



Tab to [OK] and press



This tells the TI where the data is you want the mean of. If its in *b* or some other column change letter. You may also use the name of the column "*colas*"



Leave the next three spaces alone

This one tells the TI in which column to put the answer. **Always** use an empty column because it will write over whatever is in the column.

Usually the TI tells you the empty one.

If you are recalculating and want to wipe out the old then you can do that too.

Press [OK]

leave "Frequency list" on "1"

In the first slot put the letter or name of the column that holds the data you want the Standard Deviation of

Tab to the last slot

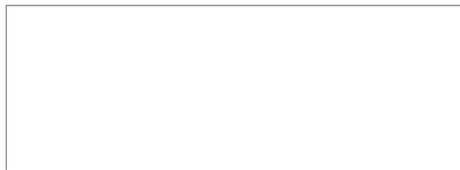
Put the letter of the column where you want the results to appear. Generally

choose an empty column



Use navigator button to move up and down the results

**Sx is the standard deviation for a sample and the one you want to use**



1.1		1.2		RAD AUTO REAL	
A	colas	B	C	D	
			=OneVar(a		
1	2	Title	One-Var...		
2	3	$\bar{x}$	2.90909		
3	6	$\Sigma x$	32.		
4	5	$\Sigma x^2$	130.		
5	1	$s_x := s_n \dots$	1.92117		
C2		=2.909090909090909			

**$\sigma_x$**  is the standard deviation for a population

1.1		1.2		RAD AUTO REAL	
A	colas	B	C	D	
			=OneVar(a		
6	4	$\sigma_x := \sigma_n \dots$	1.83177		
7	5	n	11.		
8	0	MinX	0.		
9	2	$Q_1 X$	1.		
10	1	MedianX...	3.		
C10		=3.			

### One sample T-tests

The United States has the highest teen pregnancy rate in the western world, despite the fact that US teens are not more sexually active than Swedish teens, Canadian teens, or British teens.

**The mean teenage pregnancy rate in the US is 11.85%**

<b>The rates for states in the this area ( based on survey of 15-19 year olds)</b>	
Arkansas	17.28%
Mississippi	18.75
Louisiana	17.05%
Texas	15.25%

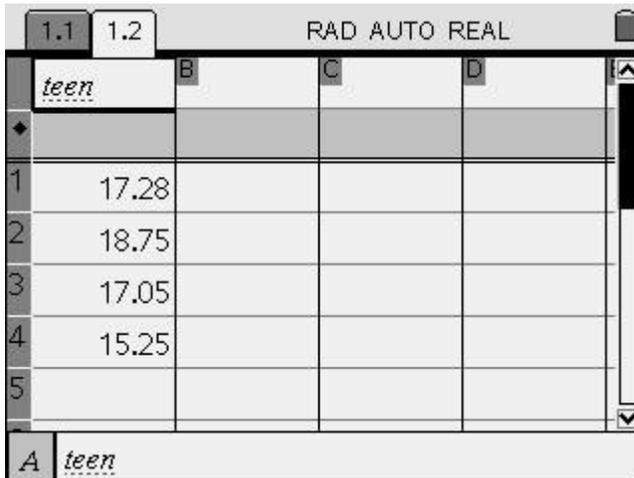
***H<sub>0</sub>:*** *There is no significant difference in the pregnancy rate of the states of Arkansas, Mississippi, Louisiana and Texas compared to the rest of the nation*

***H<sub>A</sub>:*** *There is no significant difference in the mean teenage pregnancy rate of the four states sample and the US average.*

Other Alternative hypothesis are of course possible.

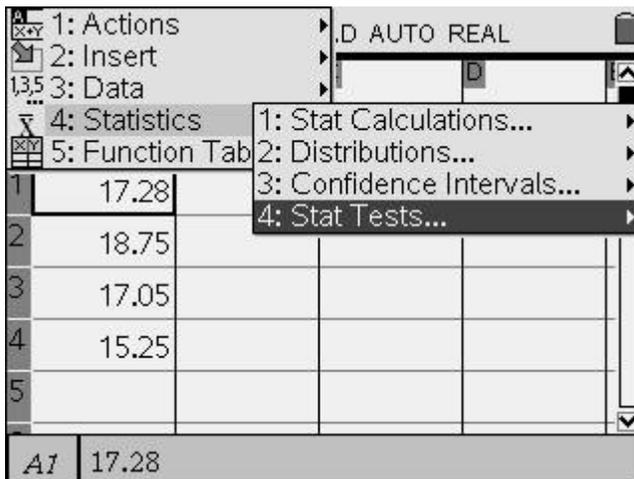
The data (the rates for Arkansas, Mississippi, Louisiana, & Texas) is in the form of a list it should be enter in column A on the Lists and Spreadsheet page and given a title.

Press  .

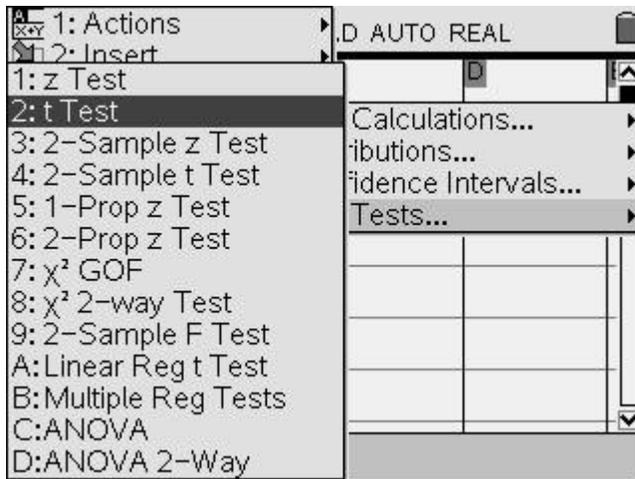


then choose 4: Statistics

then choose 4: Stat Tests

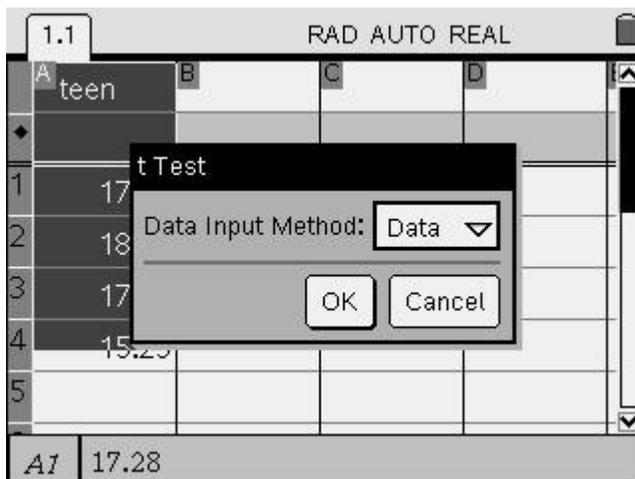


Choose 2:tTest. It is designed to test your sample against a larger or national known mean



Choose "Data" because you entered your data into a column on the List and Spreadsheet page.

.Click [OK]



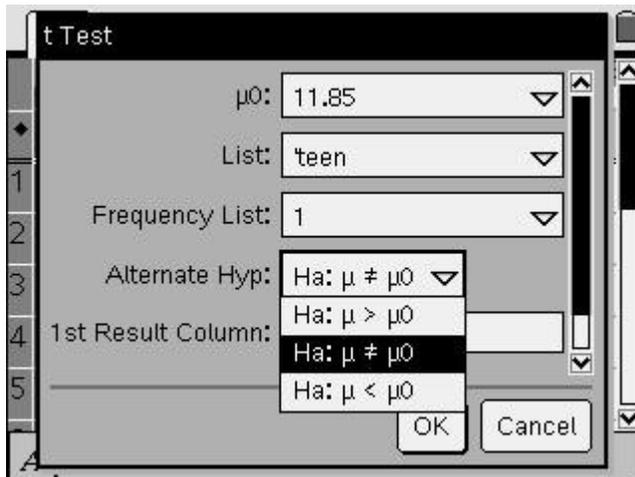
$\mu_0$ : is for the sample or national

mean you are comparing to

**List:** is the column where you put the data from your sample

**Frequency:** always 1

**Alternate Hyp:** Three hypothesis are possible



A two sided **Ha:  $\mu \neq \mu_0$**  My sample mean is significantly different from the population mean, great or less it doesn't matter it's just significantly different.

Two one sided or directional

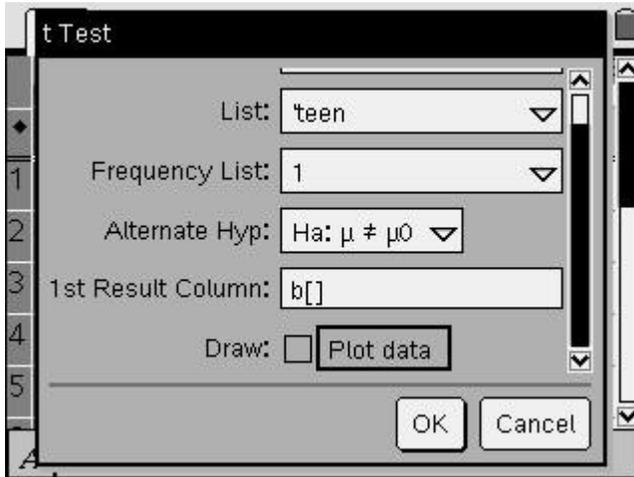
**Ha:  $\mu > \mu_0$**  My sample is greater, bigger, more than, etc. the national mean

**Ha:  $\mu < \mu_0$**  My sample is less than, fewer, smaller, etc. the national mean

1st result column: says it will put the results in the first available column. You can overwrite previous results by changing the column letter.

Try Draw plot for the fun of it but generally it doesn't give you the information you want.

[OK]



These results would be reported as  $t(3) = 7.29, P < .006$ .

1.1 RAD AUTO REAL			
A	B	C	D
teen			
		=tTest(11.3	
1	17.28 Title	t Test	
2	18.75 Alternate...	$\mu \neq \mu_0$	
3	17.05 t	7.29209	
4	15.25 PVal	0.005324	
5	df	3.	
C1		="t Test"	

However, if you are given the mean for the data the procedure is different

The average age of mothers in the US when they give birth to their first child is 25.1.  
 The average age of a sample of 200 women from the Arkansas Delta region is 21.7  $S_x = 2.6$ .

Our hypothesis is: **Ha: The age of mothers giving birth to their first child is significantly lower in the Delta region of Arkansas than the national average of the sample is significantly lower than the national average.  $H_a: \mu < \mu_0$**

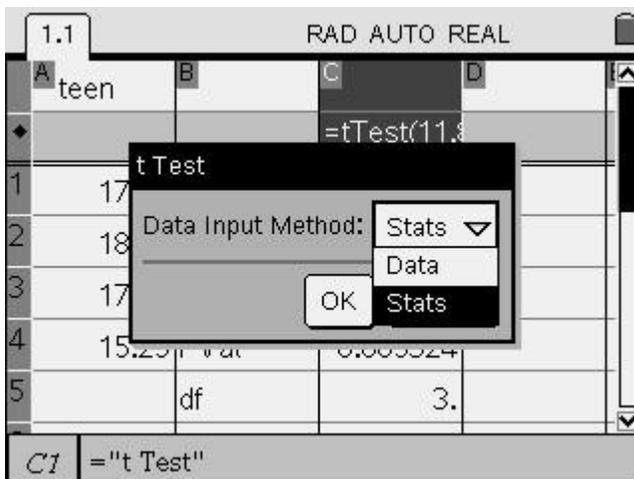
Press 

4: Statistics

4:Stat Tests"

2:t-test

choose "Stats" this time



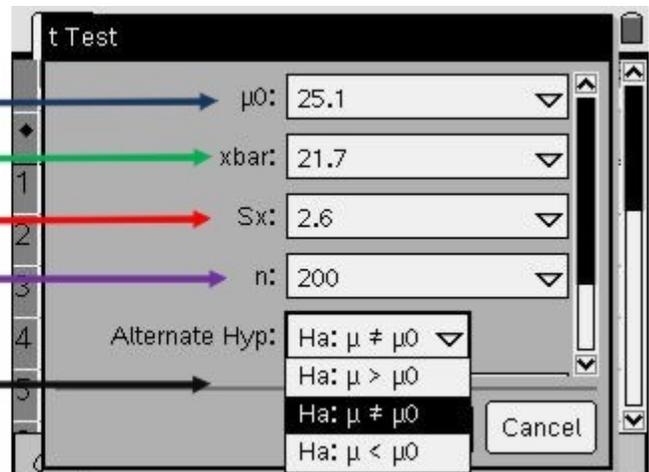
National mean you are comparing your sample to

The mean of your sample

Standard Deviation of your sample

Number in your sample

Pick your hypothesis



Pick a column for the results and skip "plot"

These results would be written: A significant difference ( $p < .000$ ) was found in the mean age for mother giving birth to their first child in the Arkansas Delta region than the national average.  $t(199) = -18.49$ ,  $p < .000$ . With the mean for the nation being 25.1 and the mean for the delta region of Arkansas being 21.7.

	D	E	F	G
1	Title	t Test		
2	Alternate...	$\mu < \mu_0$		
3	t	-18.4936		
4	PVal	0.		
5	df	199.		

**Means are usually given in addition to the t scores when the difference is significant.**

## Two Independent Sample T-Test

This t-test is used when you have two separate sample that you are comparing, they do not have to be the same size. I.e. Rainfall in one city to rainfall in another, female scores on a self-esteem test compared to males scores on the same test.

The Inspire has a 2-Sample T-Test

Enter the data for the two groups you are comparing in two, usually columns 1 & 2. Give them a title

[menu]

4:Statistics

4:Stat Tests

4:2 Sample t Test

**If you entered data  
in the columns choose  
"Data"**

**If you have  $\mu$ ,  $\sigma$  and  $n$   
then use "Stats"**

2-Sample t Test (Data)	2-Sample t Test (Stats)
List 1: 'nw' ▾	Frequency 2: 1 ▾
List 2: 'se' ▾	Alternate Hyp: $H_a: \mu_1 > \mu_2$ ▾
Frequency 1: 1 ▾	Pooled: No ▾
Frequency 2: 1 ▾	1st Result Column: c[]
Alternate Hyp: $H_a: \mu_1 > \mu_2$ ▾ $H_a: \mu_1 > \mu_2$ $H_a: \mu_1 \neq \mu_2$ $H_a: \mu_1 < \mu_2$ Cancel	Draw: <input type="checkbox"/> Plot data OK Cancel

- List 1 is your first column of data. Click on the Down arrow and pick your column title from the list
- List 2 is your second column of data again pick the name from the list
- Leave both frequencies as "1"
- Choose your Alternative hypothesis (Ha:) from the drop down list

$\mu_1 > \mu_2$  the first group is significantly more , faster, greater, etc. than the second group

$\mu_1 < \mu_2$  the first group is significantly less than, smaller, etc, than the second group

$\mu_1 \neq \mu_2$  the difference between group 1 and group 2 is not significant

If you feel the two populations are generally drawn from the same group Use "pooled". If unsure use "no"

Pick an empty column to put "results" in

Skip "Draw"

[OK]

1.1		RAD AUTO REAL		
	B	C	D	E
	se		=tTest_2S	
1	20056	Title	2-Samp...	
2	24721	Alternate...	$\mu_1 > \mu_2$	
3	19704	t	2.60833	
4	21869	PVal	0.013062	
5	23273	df	9.9963	
E1				

Name of test

Ha: (in this example)  $\mu_1 > \mu_2$  Mean 1 (first column) is greater than mean 2 (second column)

t value

Probability or P value

df

## Matched pairs t-test

Put Data in **Column A** and **Column B**

move to the third column "C" and title it \

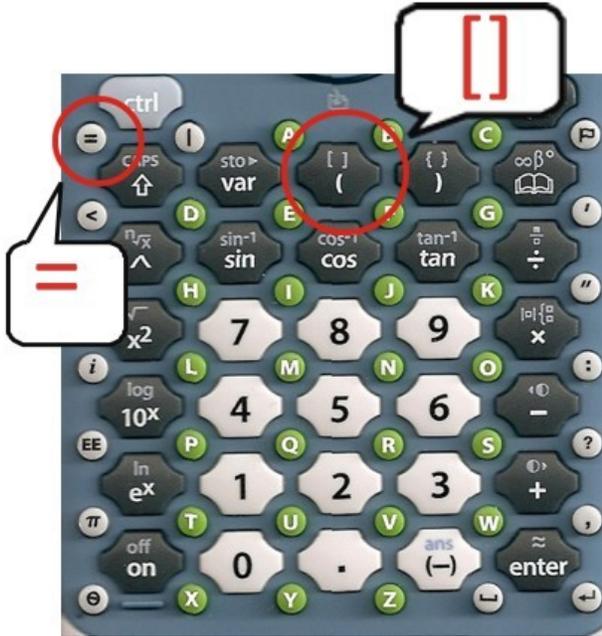
in the area just below the title but above the data area type the following formula

**=a[ ]-b[ ]**

this tells the calculator to subtract the data in column 2 from column 1 and put results in column 3

	B news	C diff	D	E
1	4			
2	7			
3	3			
4	9			
5	5			

	B news	C diff	D	E
1	4	=a[ ]-b[ ]		
2	7			
3	3			
4	9			
5	5			



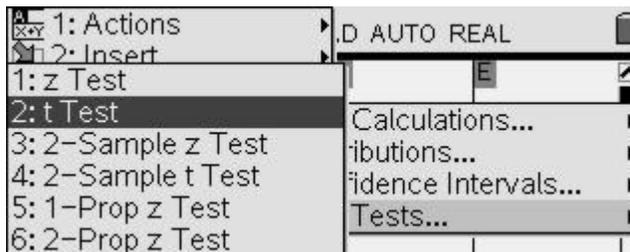
Go to

Menu

4: Statistics

4: Stat Test

**2:t test**



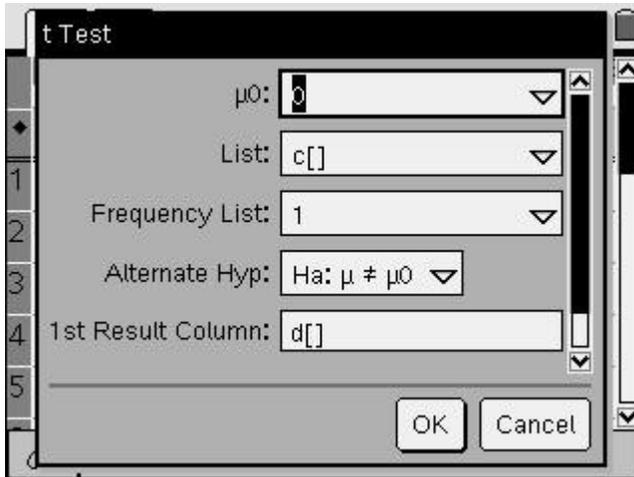
you are **not** using the 2 sample t-test because you are measuring the actual difference against "0" which is what the average difference would be if there is no difference

Data Input method" is "data"

For  $\mu$  use "0"

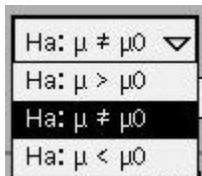
List: where you want the results

Frequency: "1"

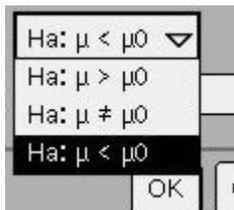


Deciding on Ha: is a little tricky

Between the first results in the first column (A) and the second column (B) what kind of change are you expecting?

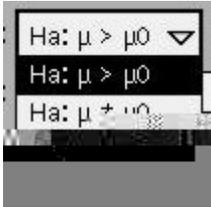


1) You believe there will be a difference but uncertain of the direction  $H_a: \mu \neq \mu_0$



2) You believe the second group will be more, be great, bigger etc.than the first or the first less than the second (these are the same thing). So you are subtracting a bigger number from smaller and if you are correct will get a negative number (or less than 0)

$H_a: \mu < \mu_0$



3) You believe the second group will be less, fewer, decreased, etc, compared to the first. So you will be subtracting a smaller number from a larger and if correct will get a difference greater than 0.  $H_a: \mu > \mu_0$

## Anova

### Doing an ANOVA on the TI is amazing simple if you have been doing t-tests

Push the Home] button

3: List and Spreadsheets

Put each list of data in a different column (this example has

	fr	soph	jr	sr
1		3	6	9
2		5	7	10
3		6	9	15
4		2	7	12
5		1	11	11

Menu]

4: Statistics

4: Stat Test

C:ANOVA hand

	fr	soph	jr	sr
1				12
2				13
3				15
4				18
5		1	11	11

ANOVA

Data Input Method: Data

Number of Groups: 4

OK Cancel

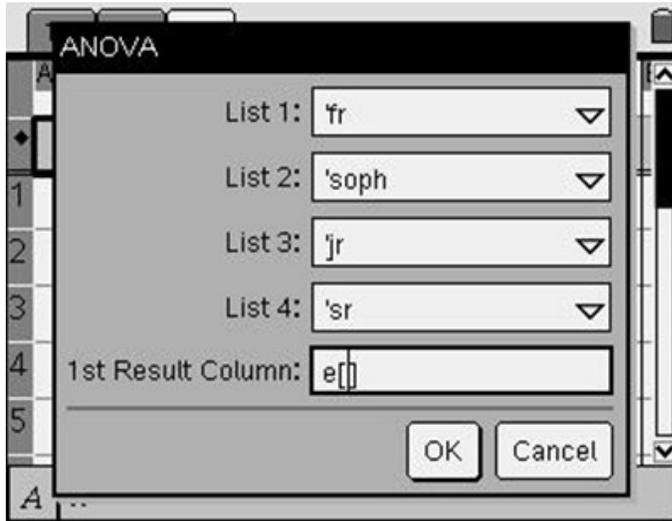
Choose "data"

Enter the number of groups

Choose the names of the groups or use a, b etc.

Put results in empty column

[OK]



**Read results and create a Source or Summary Table**

**Results are reported both in form of a Source table  
and as  $F(3, 20) = 32.68; p < .01$**

Source	SS	df	MS	F	p
<b>Between</b>	413.500	3	137.833	32.685	<.001
<b>Within</b>	84.333	20	4.217		
<b>Total</b>	497.833	23			

## Correlations

**Enter the data you want to correlate into two columns in the Data and Spreadsheet.**

**This would usually be columns *a* and *b*, title them if you wish.**

Punch [menu]

"4:Statistics"

"1: Stat Calculations" [hand]

"4:Linear Regressions(a+bx)

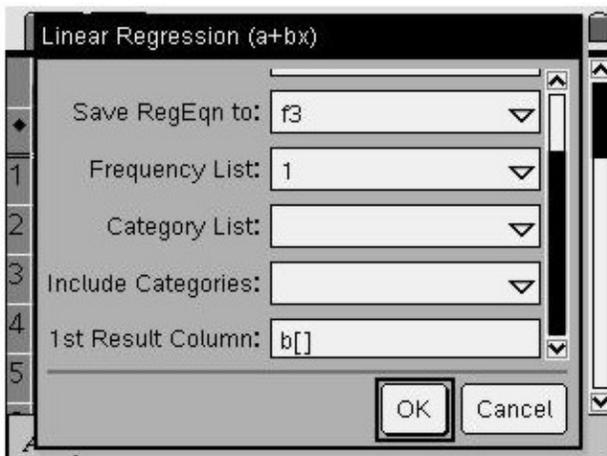
There is also a 3: Linear Regression with the formula  $(mx+b)$  This one will give you a correlation but it will also give you extra data you don't want to bother with. Avoid it.



**X List** is the column where you have the first factor you are correlating

**Y List** is where you have the second factor.

Use either the letter (a, b, etc) representing the column or the name of the column



Frequency is "1"

Finally the name of the column where the results are to start [OK]

The image shows a TI-Inspire calculator interface with a table of linear regression statistics. The table has columns labeled B, C, D, and E. The rows contain the following data:

	B	C	D	E
	y		=LinRegBx	
2	874	RegEqn	a+b*x	
3	1197	a	492.793	
4	285	b	10.5986	
5	1216	r <sup>2</sup>	0.771382	
6	950	r	0.878283	

The status bar at the bottom left shows "E6".

**$r$  = correlation**

## Chi Square

As an example assume the following Chi Square or matrix

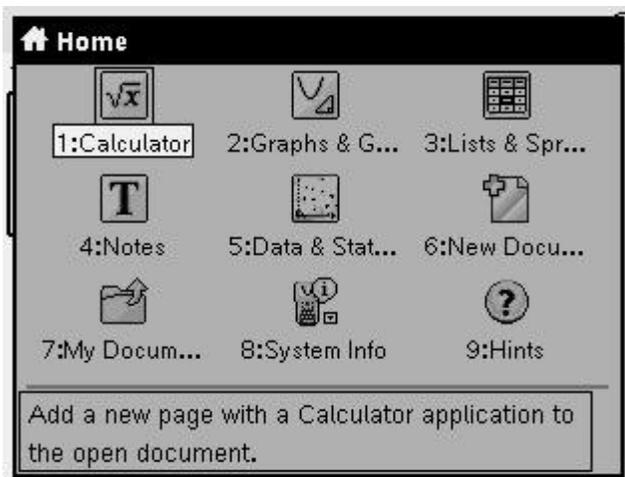
	Believes in Santa	Does not Believe in Santa	Undecided about The jolly old man
male	35	43	27
female	43	25	10

To produce a matrix that your calculator can evaluated

Push



Choose 1: Calculator [Enter]



On the calculator page type a: = [35,43,27;43,25,10]

Type data across rows

In the above example the matrix is designated by the letter “a”. Any letter or name could have been used.

Follow letter and name with a colon

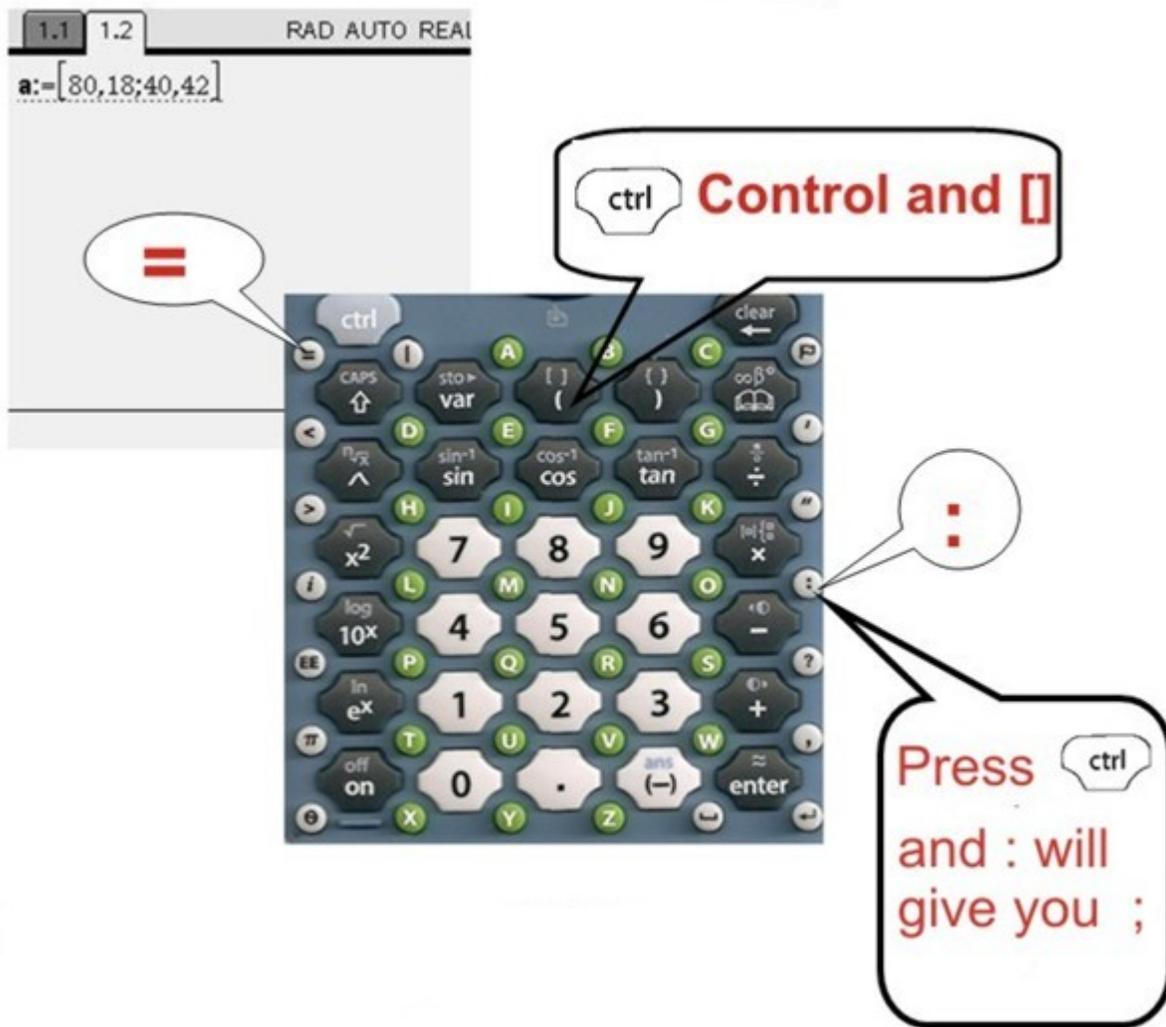
Put numbers in brackets []

Separate cells from each other with a comma

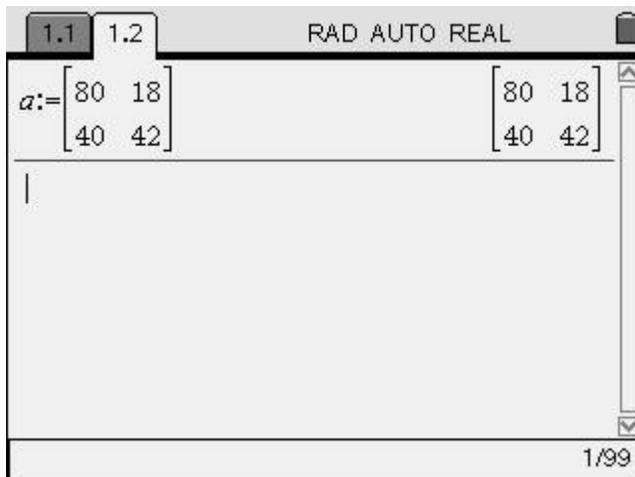
Separate rows with a semi-colon

If uncertain about how to type [] or : or ; or = see below

Pressing Control and Colon produces a semi-colon on the screen



A matrix now appears on the screen and it is designated as matrix "a"



[Menu]

5: Statistics

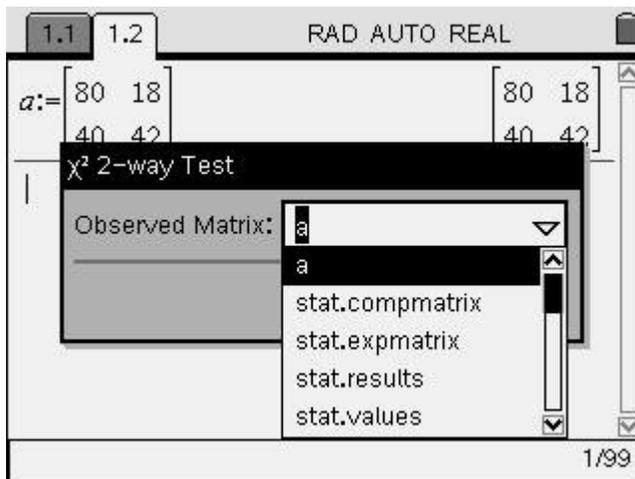
7: stat tests

8:  $\chi^2$  2-way Test

[Enter]

Choose the letter “a” or whatever you designated the matrix as for the “Observed Matrix:”

[OK]



You now have both  $\chi^2$  and you  $p$  value

## Goodness of Fit 1 X

Put observed numbers in column a (and name if you wish)

Put expected number in column b ( and name if you wish) Expected can be

Total divided by number of factors; You are saying that all factors will have equal amounts i.e. In the case of bags of M&M's you would be saying that there is an equal number of each color in each bag

A known statistic you are comparing your results to./ ie. We compare the number of M&M's, by color, in a sample of bags to the number the of each color the company claims on its website.

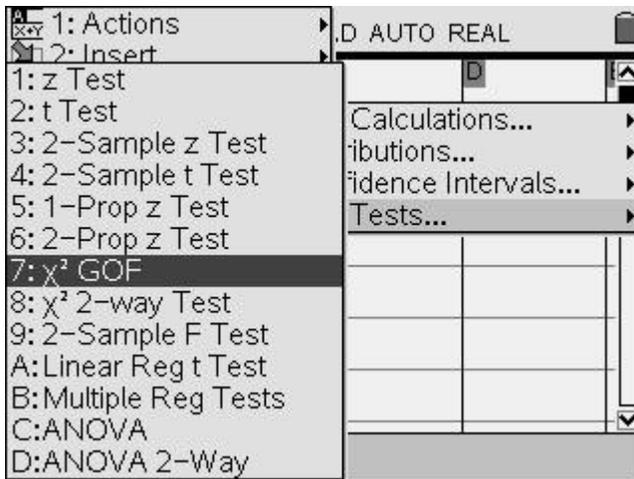
	A observ	B expec	C	D
1	5	5.5		
2	3	5.5		
3	7	5.5		
4	7	5.5		
5				

[Menu]

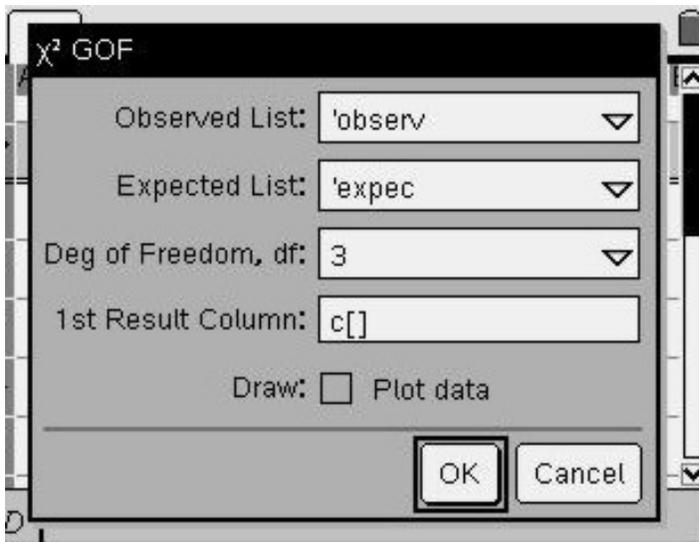
4: Statistics

4: Stat Tests

$\chi^2$ GOF



[ENTER]



"Observed List" is the location of the list your survey found (in this case Column a

"Expected List" is the location of either  
 1. Total / N  
 2. Comparison data you are using

$df = \text{number of categories} - 1$

The results gives us our  $\chi^2$  and probability

1.1 RAD AUTO REAL					
A	observ	B	expec	C	D
					= $\chi^2$ GOF('d
1	5	5.5	Title		$\chi^2$ GOF
2	3	5.5	$\chi^2$		2.
3	7	5.5	PVal		0.572407
4	7	5.5	df		3.
5			CompLis...		{0.04545...
D1		=" $\chi^2$ GOF"			

## Downloading files to another TI-Inspire

### Sending a document

1. Press  $[\text{Home}]$  7 to open *My Documents* on the sending unit.
2. Press the **up** and **down** keys to highlight the document you want to send.
3. Press  $[\text{Control}]/[\text{Home}]$  1 5 to select **Send** from the document menu.
4. When the file transfer is complete, a message displays on the receiving unit.