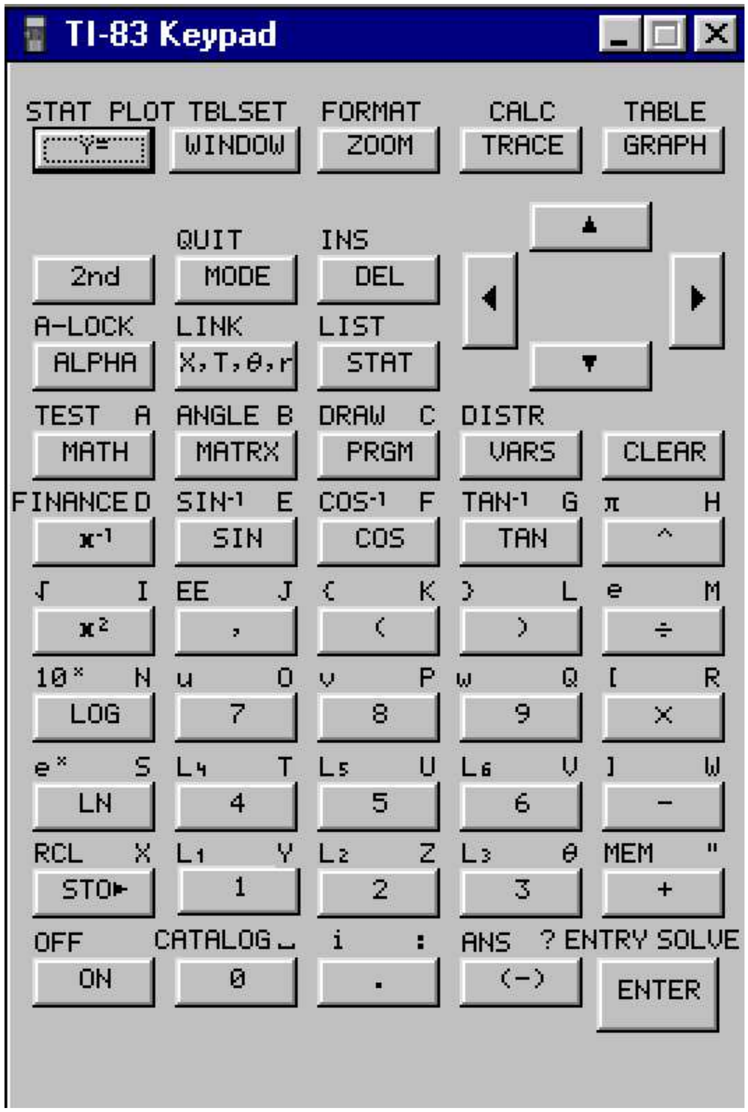
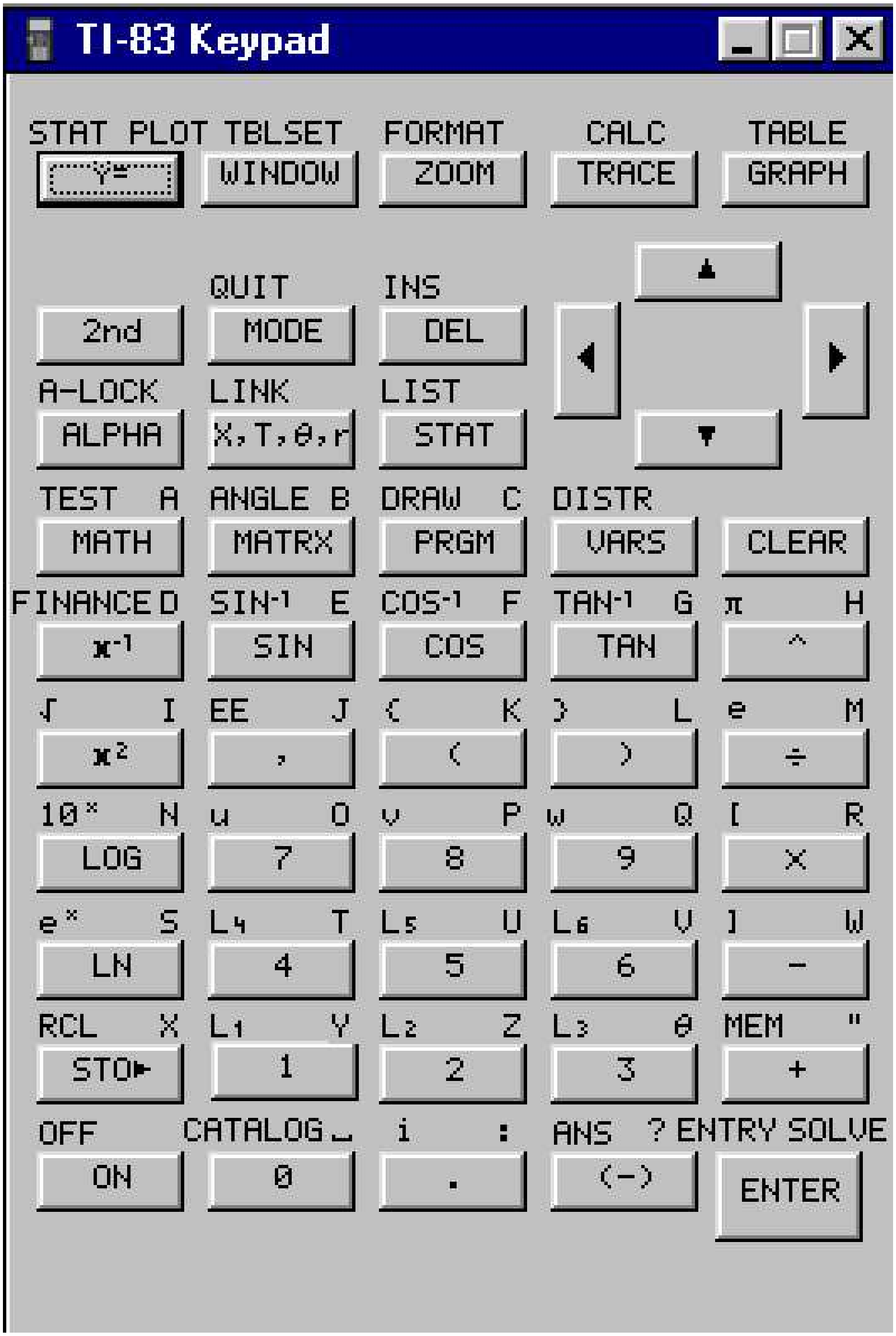
TI – 83 TUTORIAL



Version 3.0 to accompany Elementary Statistics by Mario Triola, 9th edition

Written by Donna Hiestand-Tupper
CCBC - Essex


TI-83 Keypad
STAT PLOT TBLSET FORMAT CALC TABLE
Y= WINDOW ZOOM TRACE GRAPH
QUIT INS
2nd MODE DEL
A-LOCK LINK LIST
ALPHA X,T,θ,n STAT
TEST A ANGLE B DRAW C DISTR
MATH MATRX PRGM VARS CLEAR
FINANCE D SIN-1 E COS-1 F TAN-1 G π H
x-1 SIN COS TAN ^
√ I EE J { K } L e M
x2 , ( ) ÷
10x N u O v P w Q [R
LOG 7 8 9 ×
ex S L4 T L5 U L6 V] W
LN 4 5 6 −
RCL X L1 Y L2 Z L3 θ MEM "
STO▸ 1 2 3 +
OFF CATALOG ␣ i : ANS ? ENTRY SOLVE
ON 0 . (−) ENTER

Math 153 - Introduction to Statistical Methods
TI – 83 (PLUS) Calculator Instructions

Turning the calculator on:

The ON button is located at the bottom left corner of your calculator.

Darkening the screen:

If your screen appears light and difficult to read, select the 2nd button (which is yellow), then select the up arrow, located on the upper right section of your calculator. You will notice a number in the upper right hand portion of your screen. If that number reads 7 or more, you need to get batteries for your calculator. The TI-83 takes 4 AAA batteries.

Changing the batteries in your calculator:

To change the batteries in your calculator, remove the back panel. As you remove a battery, immediately replace it with a new one. ***Do not remove all of your batteries at once.*** Doing so will cause you to lose any information, programs, etc. stored in your calculator.

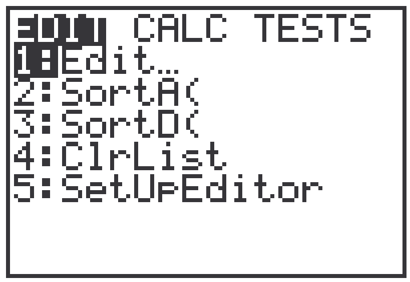
Clearing data from your list:

Go to the list by pressing STAT >> ENTER (to select the EDIT option). Hit the up arrow once. Your cursor should now be *above* the list containing the data. Hit the CLEAR key followed by the ENTER key. NOTE: Make sure you hit the Clear key and not the DEL key. You want to clear the data from the list. You do not want to delete the list.

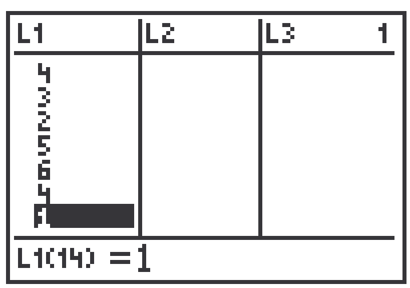
Entering data into your calculator:

EXAMPLE: Enter the following list of numbers: {4, 5, 4, 5, 9, 5, 7, 4, 3, 2, 5, 6, 4, 1}. This list of data are the baseball scores from Saturday, July 4, 1998 according to USAToday.

Select the STAT key. You will be presented with the screen below.



Select the ENTER key. You will be presented with columns titled *L1, L2, L3,* and so on. Now simply type in each data element, followed by the enter key. When finished, your screen should look like the one below.



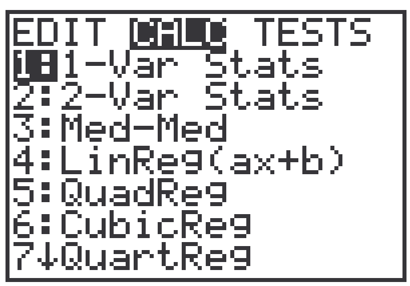
Inevitability, people do delete list instead of just clearing it. Let's assume you deleted L1. To reinsert L1 in its proper location, select STAT >> EDIT

>> Hit the up arrow so that L2 is highlighted >> 2nd (yellow key) >> INS (above the DEL key) >> 2nd (yellow key) >> L1 (above the number 1) >> ENTER

CHAPTER 2 SECTIONS 2-4, 2-5 & 2-7: Calculating the Mean, Standard Deviation, and 5 Number Summary

EXAMPLE: Calculate the summary statistics for the data entered in the previous baseball example.

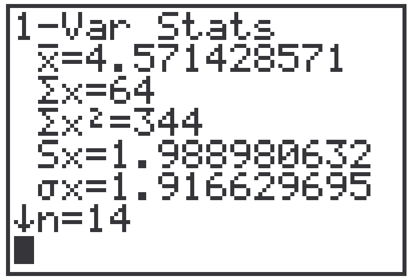
Once your data is entered into your calculator, select STAT >> the left arrow (CALC should be highlighted) >> 1 (the option for 1-Var Stats).



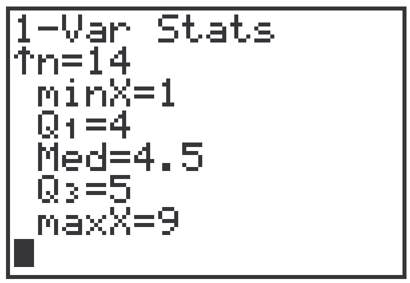
Your screen should say 1-Var Stats. If your data is in list *L1*, you can simply hit the ENTER key again.

{If your data is not in L1, you need to specify which list your data is in. To do this, hit 2nd followed by the list number your data is in, for example 2nd followed by 2 means the data is in L2. Then hit the ENTER key.}

Your screen should look like the one below.



To get the 5 number summary, keep hitting the down arrow.



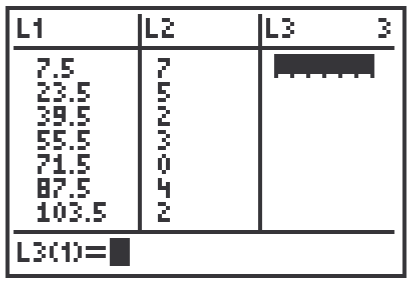
CHAPTER 2 SECTIONS 2-4 & 2-5: Calculating the Mean and Standard Deviation from Grouped Data

EXAMPLE: Consider the frequency table of the number of runs scored by the 1996 New York Yankees.

Number of Runs Scored	*Class Mark*	*Frequency*
0-15	*7.5*	*7*
16-31	*23.5*	*5*
32-47	*39.5*	*2*
48-63	*55.5*	*3*
64-79	*71.5*	*0*
80-95	*87.5*	*4*
96-111	*103.5*	*2*

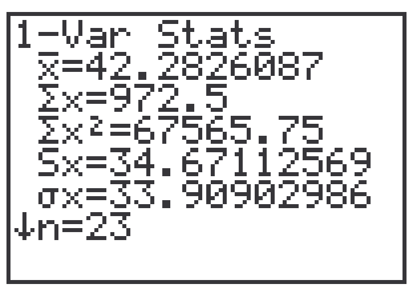
Determine the mean and the standard deviation for the number of runs scored per 1996 New York Yankee.

By going into STAT >> EDIT >> option 1 (for Edit), enter the class marks in L1 and the frequencies in L2. Your screen should look like the one on the next page:



Now, by hitting STAT >> CALC >> ENTER (for 1-Var Stats) >> 2nd L1 >> , >> 2nd L2. Your screen should look like the one below:

Hit the ENTER key and your screen should look like the one below.



The mean number of runs scored per 1996 New York Yankee is 42.3. The standard deviation of the number of runs scored per 1996 New York Yankee is 33.9.

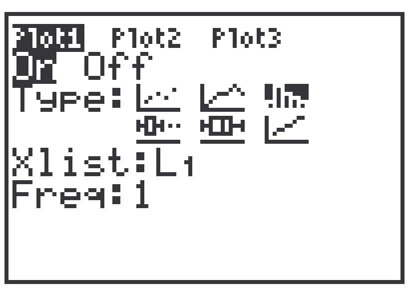
NOTE 1: This is population data since it consist of data the number of runs scored by all 1996 New York Yankees.

NOTE 2: It is important that L1 contains the class marks and L2 contains the frequencies.

CHAPTER 2 SECTIONS 2-3 & 2-7: Creating Statistical Graphs

EXAMPLE: Create both a histogram and a boxplot for the baseball data in the example above.

To graph your data, select 2nd button (which is yellow) >> STAT PLOT >> ENTER. Select the ENTER key again to turn Plot 1 ON.

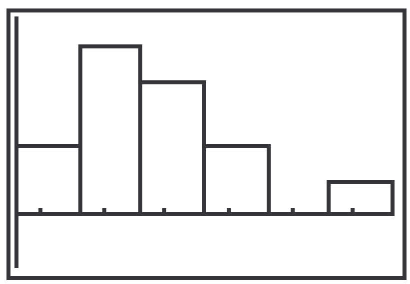


Hit the down arrow key to move to the next option which is for the type of graph you want to select. I've selected the histogram. Using the right arrow key, select the type of graph you want. Hit ENTER again to select the graph type.

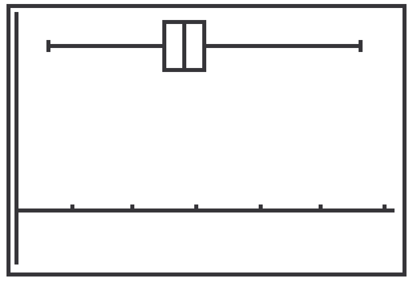
If your data is not in *L1*, (or for scatter plots *L1* and *L2*), you will need to specify which list the data is in.

In order to assure a proper viewing window, hit the ZOOM button, followed by the number 9 (for ZOOM STAT).

Below is the histogram for the data in our first baseball example on entering data (baseball scores from July 8, 1998). The original data is located on page 2 of this workbook.



To create the simplified boxplot, repeat the steps outlined above, except under type, select the boxplot instead of histogram. You graph should look like the one below.



NOTE: To see the five number summary that was used to create this boxplot, hit the TRACE key, followed by the left and right arrows to move along the graph. Check with your instructor to see if they want you to use the simplified or standard boxplot.

CREATING A HISTOGRAM FROM GROUPED DATA

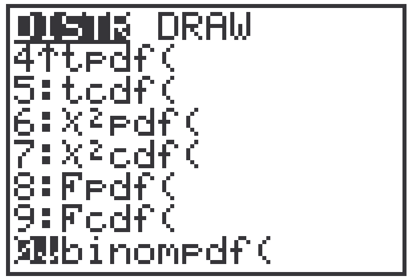
To create a histogram with grouped data, you need to put the class marks in L1 and the frequencies in L2. (To enter data, select STAT >> ENTER to get to the Edit screen) >> Now type in your data.

When the data is entered into the calculator, select 2^{nd} >> Y= (to get to STAT PLOT) >> ENTER (to get to the Plot 1 screen)

Make sure *Plot1* is turned On (On will appear in reverse video).
Under *Type*, select the histogram (1^{st} row, far right).
Under *Xlist*, enter L1.
Under *Freq*, enter L2 (instead of the 1 which is there by default).

CHAPTER 4 SECTION 4-3:
Calculating Binomial Probabilities

To calculate binomial probabilities, press 2^{nd} key followed by the VARS key to get to the DISTR menu. Arrow down until you arrive at *binompdf (*. It is option number 0.

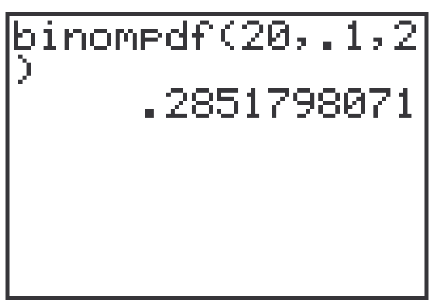


Hit the ENTER key. Type in the values of *n*, *p*, and *x* in that order, separated by commas. Close your parenthesis, then press ENTER.

The syntax template is binompdf(n, p, x)

EXAMPLE: 10% of the population is left-handed. In a class of 20 people, what is the probability that exactly 2 people are left-handed.

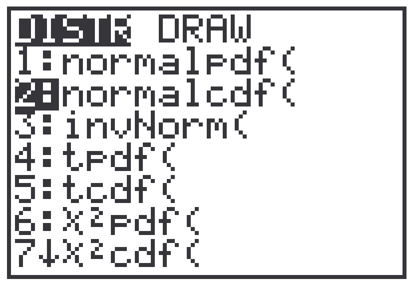
ANSWER: Using the keystrokes defined above, your screen should look like the one below. Remember, the binompdf command needs 3 arguments: n, p, and x, ***in that order****. In this example, n = 20, p = .10, and x = 2. Remember to separate the arguments with commas. The probability of exactly 2 out of the 20 people being left-handed is 28.5%. See the graph below.*



CAUTION: If x > n, the calculator will produce a wrong answer. There is no error message.

CHAPTER 5 SECTION 5-2:
The Standard Normal Distribution

To calculate normal probabilities, press 2nd key followed by the VARS key to get to the DISTR menu. Arrow down until you arrive at *normalmcdf (*. It is option number 2.

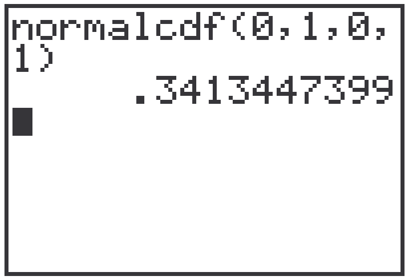


Hit the ENTER key. Type in the values of the *lower boundary*, the *upper boundary*, the *mean* and the *standard deviation* in that order, separated by commas. Close your parenthesis, then press ENTER.

The syntax template is
normalcdf(lower bound, upper bound, mean, standard deviation)

EXAMPLE: The Heater Meter Thermometer Company manufacturers thermometers. The mean temperature of all thermometers produced, at the freezing point of water, is 0° and the standard deviation is 1°. If a thermometer is randomly selected, what is the probability that, at the freezing point of water, the reading is between 0° and 1.0°.

ANSWER: Using the keystrokes defined above, your screen should look like the one below. Remember, the normalcdf command needs 4 arguments: lower bound, upper bound, μ, and σ. In this example, the lower bound is 0, the upper bound is 1, the mean is 0, and the standard deviation is 1. Remember to separate the arguments with commas. 2nd VARS (to get to DISTR menu) >> 2 (for normalcdf) >> 0, 1, 0, 1) >> ENTER. From the *screen on the following page, we see the probability of randomly selected thermometer reading between 0° and 1° is 34.13%.*



NOTE: For questions that ask for the region above a certain value (for example, z > 2.00), the upper bound is positive infinity. To simulate this on the calculator, we will make the upper bound a really large number, like 99,999.

Similarly, for questions that ask for the region below a certain value, the lower bound is negative infinity. To simulate this on the calculator, we will make the lower bound a really small number, like –99,999.

Remember to type in the negative key, in the last row fourth column (next to the ENTER key). Do not type in the subtraction key.

EXAMPLE: The Heater Meter Thermometer Company manufacturers thermometers. The mean temperature of all thermometers produced, at the freezing point of water, is 0° and the standard deviation is 1°. If a thermometer is randomly selected, what is the probability that, at the freezing point of water, the reading is above 1.5°.

ANSWER: Using the keystrokes defined above, your screen should look like the one below. Remember, the normalcdf command needs 4 arguments: lower bound, upper bound, μ, and σ. In this example, the lower bound is 1.50, the upper bound is 99,999, the mean is 0, and the standard deviation is 1. Remember to separate the arguments with commas. The probability of randomly selected thermometer reading above 1.5° is 6.68%. See the screen below.

CHAPTER 5 SECTION 5-3:
Nonstandard Normal Distributions

The procedure for finding the area under the nonstandard normal curve using the TI-83 is the same as for finding the area under the standard normal curve. The only thing you need to remember is that the mean is no longer always 0 and the standard deviation is no longer always 1.

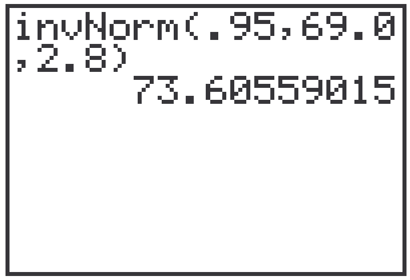
The syntax template remains
normalcdf(lower bound, upper bound, mean, standard deviation)

CHAPTER 5 SECTION 5-3:
Nonstandard Normal Distributions – Finding Z-scores

To find the raw score that separates part of the population from the rest, we will use the invNorm function. To get to the invNorm function, press 2nd key followed by the VARS key to get to the DISTR menu. Arrow down until you arrive at *invNorm(*. It is option number 3. Hit ENTER. The invNorm function requires three parameters: the area *below* that score, the mean, and the standard deviation. The parameters must be in that order and separated by commas.

EXAMPLE: The heights of men are normally distributed with a mean of 69.0 inches and a standard deviation of 2.8 inches. Find the height that separates the upper 5% of men from the rest of the population.

ANSWER: Using the keystrokes defined above, your screen should look like the one below. 2nd VAR (to get to DISTR menu) >> 3 (for invNorm) >> .95, 69.0, 2.8) >> ENTER. Remember, the invNorm command needs 3 arguments: the probability or area in the below the desired raw score, μ, *and σ. Since we want the height that separates the upper 5% of the curve from the lower 95% of the curve, the area below the desired score is 95%, or 0.95. Using the invNorm function, we see that the height that separates the upper 5% of men from the rest of the population is 73.6 inches. See the screen on the next page.*

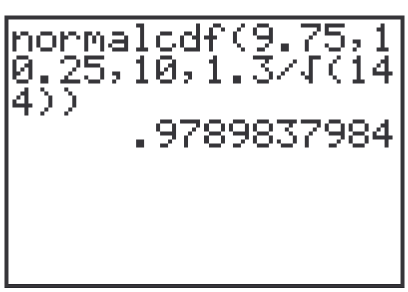


CHAPTER 5 SECTION 5-5:
The Central Limit Theorem

To work problems that require the Central Limit Theorem, the calculator takes the same approach as the standard normal distribution from section 5-2. The only difference is that when you put in the standard deviation, remember that $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$.

EXAMPLE: The CB&O pet food company manufactures premium cat food in 10 pound bags with a standard deviation of 1.3 pounds per bag. Find the probability that a random sample of 144 bags will have a mean between 9.75 and 10.25 pounds.

ANSWER: Since the Central Limit Theorem applies, hit 2^nd VARS (to get to DISTR menu) >> 2 (for normalcdf) >> 9.75 (the lower bound) >> 10.25 (the upper bound) >> 10 (the mean) >> $1.3 \div \sqrt{(144}$)(don't forget to close the parenthesis for the square root) >>) (to close the parenthesis for the normalcdf >> ENTER. From the screen capture below, we can see that the probability of 144 bags weighing between 9.75 and 10.25 pounds is 97.90%.



CHAPTER 5 – Drawing and Shading the Normal Curve

The first step is to set up the window so that your graph fits on the screen. Allow the Xmin to be approximately the mean - 3 * standard deviation. Allow the Xmax to be approximately the mean + 3 * standard deviation, and Xscl = 1. Ymin and Ymax will depend on the graph. Let the Yscl = .1.

The next step is to clear the screen of any previous drawings. To do this, simple follow the keystrokes: 2^{nd} >> DRAW (above the PRGM key) >> ENTER (to select ClrDraw) >> Hit ENTER again

To create a shaded picture of the normal curve, we need the ShadeNorm function which is found under the DISTR DRAW menu. The ShadeNorm function takes on the form ShadeNorm(lowerbound, upperbound, μ, σ)

CAUTION: Remember to make sure your STAT PLOTS and any equations under Y= are OFF.

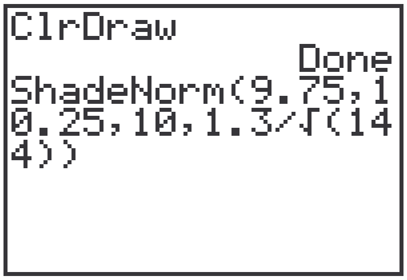
EXAMPLE: The CB&O pet food company manufactures premium cat food in 10 pound bags with a standard deviation of 1.3 pounds per bag. Find the probability that a random sample of 144 bags will have a mean between 9.75 and 10.25 pounds. Draw and shade the corresponding region of the normal curve.

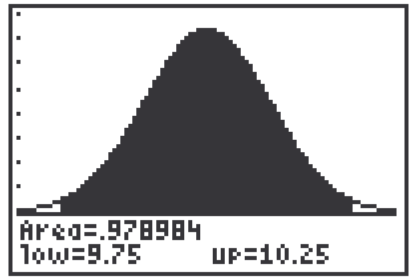
ANSWER:

*Allow the Xmin to be about 9.675 which can be put in the calculator as (10 - 3 * 1.2 $\div\sqrt{144}$). Allow the Xmax to be about 10.325 i.e. (10 + 3 * 1.2 $\div\sqrt{144}$) and Xscl = 1. Let Ymin = -1.0, Ymax = 4 and Yscl = 0.5.*

2^{nd} >> DRAW (above the PRGM key) >> ENTER (to select ClrDraw) >> ENTER (to actually clear the drawings)

2^{nd} >>DISTR (above the VARS key) >> $\rightarrow$ (to select DRAW) >> ENTER (to select ShadeNorm(which is option 1) >> 9.75, 10.25, 10, 1.3$\div\sqrt{144}$) >>) >> ENTER



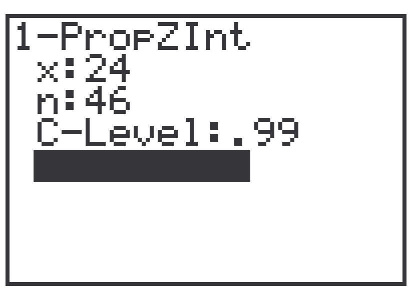


CHAPTER 6 SECTION 6-2:
Calculating Confidence Intervals For 1 Proportion, Based on Summary Statistics

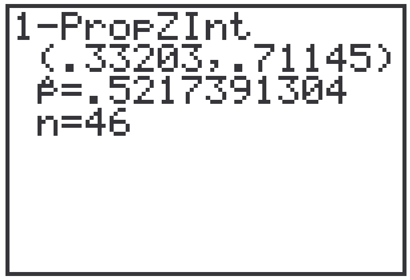
EXAMPLE: A pack of M&M's contained 46 M&M's, 24 of which are brown. Construct a 99% confidence interval for the true proportion of brown M&M's.

Hit the STAT button, followed by the right arrow twice. TESTS should be highlighted. Arrow down until you arrive at *1-PropZInt…*. It is the option lettered A. Hit the ENTER key. (Question: "Why do we use *1-PropZInt*?")

Type in the values of *x (which is 24)*, *n (which is 46)*, and the *C-Level (which is .99)*. Your screen should look like the one below.



Highlight CALCULATE, then hit ENTER. The confidence interval, $\hat{p}$, and n will be displayed.



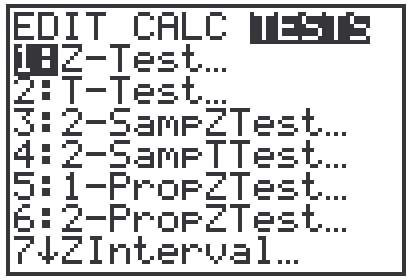
We can say, with 99% confidence, that the true proportion of brown M&M's in a pack is between .33 and .71 (or between 33% and 71%).

NOTE: If the question gives you $\hat{p}$, you will need to go back and calculate x in order for the calculator to determine the interval for you. Since $\hat{p} = \frac{x}{n}$, using basic algebra, we can see that $x = \hat{p} * n$. You may need to round off because x needs to be an integer. (Remember, x represents the number of "successes", and you can't have part of a success.) This will give you an approximation of the actual interval.

CHAPTER 6 SECTION 6-3:
Calculating Confidence Intervals Using the Normal Distribution Based on Summary Statistics

EXAMPLE: The Fluffy Lump is a cat toy company that sells catnip by the pound. Although the boxes are advertised at 16 oz., a random sample of 50 boxes yielded a mean of 16.2 oz. and the assumed population standard deviation of 0.04 oz. Construct a 95% confidence interval for the population mean weight of boxes of catnip.

Hit the STAT button, followed by the right arrow twice. TESTS should be highlighted.



Arrow down until you arrive at *ZInterval….* It is option number 7. Hit the ENTER key.

The *Inpt* option asks if raw data or summary statistics are to be used.

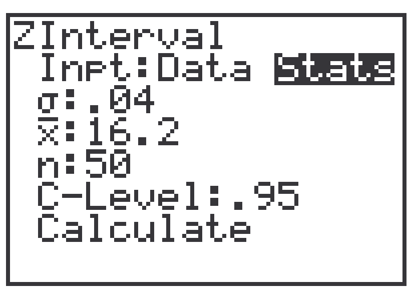
Under *Inpt*, highlight *STATS* and hit ENTER. Hit the down arrow so that you can type in the standard deviation.

Next to σ, type in the value of the population's standard. For this example σ = *0.04*. Hit the down arrow so that you can type in the sample mean, $\bar{x}$.

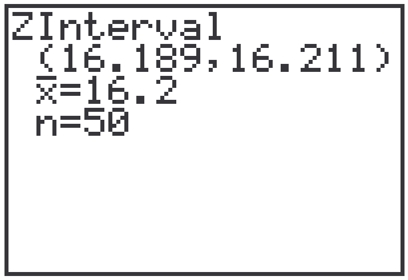
Next to $\bar{x}$, type in the value of the sample mean. For this example, $\bar{x}$ = *16.2*. Hit the down arrow again so that you can type in the sample size, *n*.

Next to *n*, type in the sample size, which in this example is *50*. Hit the down arrow again so that you can type in the confidence level.

Type in the confidence level, which is 95*%*. Hit the down arrow so that CALCULATE is highlighted. Your screen should look like the one below.



Hit the ENTER key. The interval, $\bar{x}$, and *n* will be displayed.



We can say with 95% confidence, that the populations mean weight of boxes of catnip sold by Fluffy Lump is between 16.189 ounces and 16.211 ounces.

CHAPTER 6 SECTION 6-4:
Calculating Confidence Intervals Using the T-Distribution, Based on Summary Statistics

Hit the STAT button, followed by the right arrow twice. TEST should be highlighted. Arrow down until you arrive at *TInterval….* It is option number 8. Hit the ENTER key. (Question: "Why do we use *TInterval* instead of *ZInterval*?")

Under *Inpt*, highlight *STATS* and hit ENTER. Hit the down arrow so that you can type in the sample mean, $\bar{x}$.

Next to $\bar{x}$, type in the value of the sample mean. Hit the down arrow again so that you can type in the sample standard deviation, *s*.

Next to *s*, type in the value of the sample's standard deviation. Hit the down arrow so that you can type in the sample size, *n*.

Next to *n*, type in the sample size. Hit the down arrow again so that you can type in the confidence level.

Type in the confidence level. Hit the down arrow so that CALCULATE is highlighted. Hit the ENTER key. The interval, $\bar{x}$, *Sx,* and *n* will be displayed.

CHAPTER 6 SECTIONS 6–2 – 6.5:
Calculating Confidence Intervals When Raw Data Is Given

Enter the data in *L1*. Follow the steps outlined above, except under *Inpt:* highlight Data. If you don't know the samples mean and/or standard deviation, you will need to determine that before you begin determining the confidence interval. To do this, follow the keystrokes below.

STAT>>CALC>>1-Var Stats>>ENTER>>ENTER.

CHAPTER 7 SECTION 7–2:
Conducting Hypothesis Test For 1 Proportion, Based on Summary Statistics

EXAMPLE: A pack of M&M's contained 46 M&M's, 24 of which are brown. According to the M&M Mars company, 30% of M&M's are brown. At the .05 level of significance, test the companies claim.

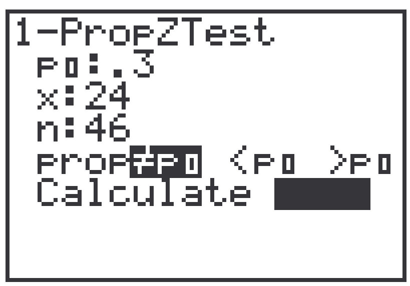
Before using the calculator, decide what kind of test is to be done and then determine the null and alternative hypothesis.

$$H_0 : p = .30$$
$$H_1 : p \neq .30$$

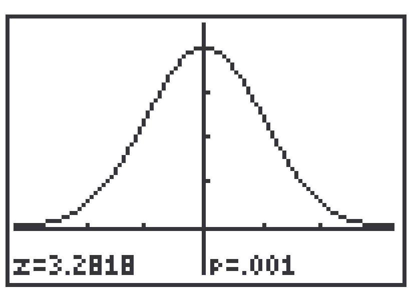
Hit the STAT button, followed by the right arrow twice. TEST should be highlighted. Arrow down until you arrive at *1-PropZTest….* It is option number 5. Hit the ENTER key.

Type in the value of the population proportion p_0 *(which here is .30), x (which is 24)*, and *n (which is 46)*. Hit the down arrow key to move between fields.

Next to *prop*, use your right arrow to select the structure of the alternate hypothesis. For this example, the alternate hypothesis is ≠. Hit the down arrow. Your screen should look like the one below.



Select DRAW or CALCULATE as before.



Since the test statistic is 3.28 and the p-value is 0.001, we reject the null hypothesis. The data does not support the M&M Mars company's claim that 30% of M&M's are brown.

CHAPTER 7 SECTION 7-3:
Conducting Hypothesis Test, 1 Population, Using the Standard Normal Distribution:

EXAMPLE: The Fizzy Pop Soda Company produces 2 liter bottles of soda. A random sample of 40 bottles yielded a mean of 1.95 liters and an assumed population standard deviation of 0.2 liters. At the 0.01 level of significance, test the company's claim that their soda bottles contain 2 liters of soda.

Before using the calculator, decide what kind of test is to be done and then determine the null and alternative hypothesis.

$$H_0 : \mu = 2$$
$$H_1 : \mu \neq 2$$

Hit the STAT button, followed by the right arrow twice. TESTS should be highlighted. Arrow down until you arrive at *Z-Test …* It is option number 1. Hit the ENTER key. (Question: "Why do we use *ZTest*?")

You will now be in the Z-TEST option window. Under *Inpt*, highlight *STATS* and hit ENTER. Hit the down arrow so that you can type in the population mean.

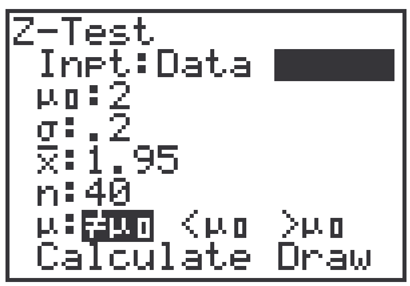
Next to μ_0, put in the population mean. This is the number you are using in your null hypothesis. For our example, the mean is *2.0*. Hit the down arrow so that you can type in the standard deviation.

Next to σ, type in the value of the population's standard. For our example, the standard deviation is *0.2*. Hit the down arrow so that you can type in the sample mean, $\bar{x}$.

Next to $\bar{x}$, type in the value of the sample mean. For our example, the samples mean is *1.95*. Hit the down arrow again so that you can type in the sample size, *n*.

Next to *n*, type in the sample size. For our example, the sample size is *40*. Hit the down arrow again so that you can select the structure of the *alternate hypothesis*.

Use you right arrow key to select the alternate hypothesis. Since the companies claim is that the soda bottles contain 2 liters of soda, the alternate hypothesis is that they do not contain 2 liters of soda. Therefore the alternate hypothesis is $\mu \neq \mu_0$. Hit the down arrow again. Your screen should look like the one below.

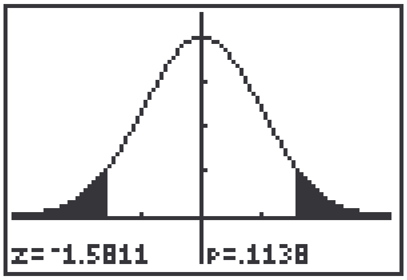


Select DRAW to see a picture of the standard normal curve, shaded in the appropriate direction, the value of the test statistic, and the p-value. Select CALCULATE to calculate the test statistic and the p-value, without the picture.

NOTE: If you select DRAW, turn off STAT PLOT. To do this, follow the keystrokes below:

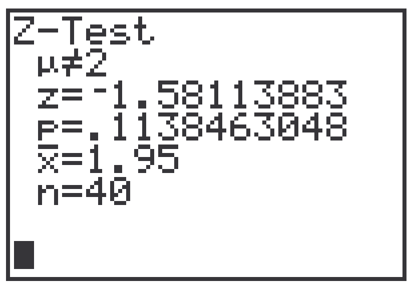
2^{nd} >> STAT PLOT >> ENTER >> right arrow >> ENTER >> 2^{nd} >> QUIT

If you selected DRAW, your screen should look like the one below.



The value of the test statistic is z = -1.58. The p-value is 0.1138. Since the p-value is greater than the level of significance, we don't reject the null hypothesis. The data does not warrant rejection of the company's claim.

If you selected CALCULATE, you screen should look like the one below:



CHAPTER 7 SECTION 7-5:
Conducting Hypothesis Test, 1 Population, Using the T - Distribution

Hit the STAT button, followed by the right arrow twice. TEST should be highlighted. Arrow down until you arrive at *T-Test…*. It is option number 2. Hit the ENTER key.

Under *Inpt*, highlight *STATS* and hit ENTER. Hit the down arrow so that you can type in the population mean, μ.

Next to μ_0, type in the value of the population mean. Hit the down arrow again so that you can type in the sample mean, $\bar{x}$.

Next to s_x, type in the value of the sample's standard deviation. Hit the down arrow so that you can type in the sample size, *n*.

Next to *n*, type in the sample size. Hit the down arrow again so that you can select the structure of the *alternate hypothesis*.

Use you right arrow key to select the alternate hypothesis. Hit the down arrow again.

Select DRAW to see a picture of the t - curve, shaded in the appropriate direction, the value of the test statistic, and the p-value. Select CALCULATE to calculate the test statistic and the p-value, without the picture.

CHAPTER 7 SECTIONS 7-3 through 7-5:
Conducting A Hypothesis Test When Raw Data Is Given

Enter the data in *L1*. Follow the steps outlined above, except under *Inpt:* highlight *Data*. When conducting a hypothesis test using the standard normal distribution, if you don't know the sample's standard deviation, you will need to determine it before you begin the calculations for the hypothesis test.

CHAPTER 8 SECTION 8-2:
Conducting Hypothesis Test For Difference Between Two Proportions

Confidence intervals given two populations proportions can also be determined using the TI-83.

For the inferences about two population proportions, under STAT >> TEST, select option 6 (2-PropZTest…). Fill in the fields as before.

CHAPTER 8 SECTION 8-3: Conducting Hypothesis Test, Two Population, Independent Samples

Conducting hypothesis tests with two samples is performed very much like hypothesis tests with one sample except that you are required to enter information about 2 samples.

Follow the keystrokes below:

STATS >> Right arrow twice (for Test) >> 4 (option 4 is for 2-SampTTest)

Fill in the window as appropriate, using the down arrow to go between fields. The only difference is that the second to last field asks if the variances are to be *POOLED*. You will need to use you right arrow key to answer *Yes* or *No*. (Remember: If the populations appear to have equal variances, use the POOLED option. If the populations appear to have unequal variances, do NOT use the POOLED option.)

CHAPTER 8 SECTION 8-4: Conducting Hypothesis Test For Difference Between Two Means – Dependent (or Matched) Samples

Select STAT >> ENTER so that you can edit a list. You should be in list *L1*.

Since we will conduct a test on differences, enter the differences in a list as follows:

Type in the value of the before data, the subtraction key (located above the + key), and then the value of the after data. Hit the ENTER key. The value of the difference between the before and after data value, i.e. before – after, will be the first data element in *L1*. Continue in this manner until all the differences have been entered.

To calculate the test statistic, follow the keystrokes below:

Select STAT >> right arrow twice to TESTS >> T-Test (option 2)

Next to *Inpt:* select DATA.

Next to *List:* select *L1*.

Skip *Freq:*.

Use you right arrow key to select the alternate hypothesis. Hit the down arrow again.

Select either CALCULATE or DRAW.

CHAPTER 8 SECTION 8-2, 8-3 and 8-4: Confidence Intervals – Two Populations:

Confidence intervals given two populations can also be determined using the TI-83.

For the inferences about two means, independent large samples, under STAT >> TEST, select option 9 (2-SampZInt…). Fill in the fields as before.

For the inferences about two means, dependent small samples, under STAT >> TEST, select option 8 (TInterval…). Make sure that *Inpt* is DATA, then fill in the fields as before.

For the inferences about two proportions, under STAT >> TEST, select option B (2-PropZInt…). Fill in the fields as before.

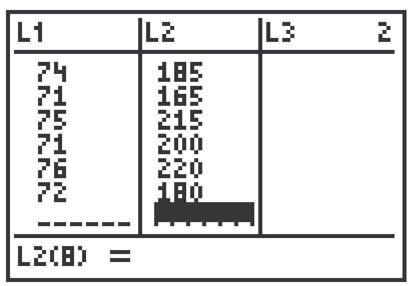
For the inferences about two means, independent small samples, under STAT >> TEST, select option 0 (2-SampTInt…). Fill in the fields as before.

CHAPTER 9 SECTION 9-2:
Linear Regression – Determining the Centroid

EXAMPLE: Listed below are the heights and weights of a random sample of 7 Seattle Mariners from the 1997 season. Determine the centroid for this set of data.

x-height	72	74	71	75	71	76	72
y-weight	175	185	165	215	200	220	180

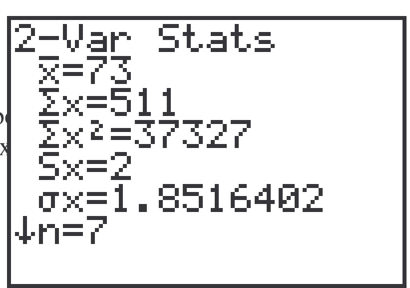
Enter you x values in *L1* and your y values in *L2*.

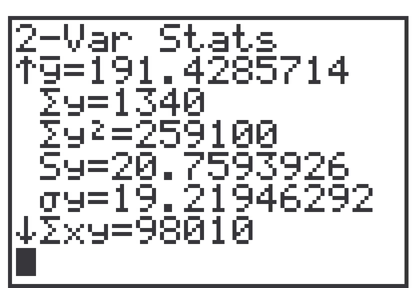


Follow the keystrokes below:

STAT >> arrow once to the right for CALC >> 2 (option 2 for 2-Var Stats) >> ENTER

The value of $\bar{x}$ will be on the screen. You will need to arrow down to see the value of $\bar{y}$.





Therefore the centroid is (73, 191.4). The average Seattle Mariner from the 1997 season is 73 inches tall and weighs 191.4 lbs.

CHAPTER 9 SECTION 9-3:
Linear Regression – Equation, Correlation Coefficient, Coefficient of Determination, Standard Error of the Estimate

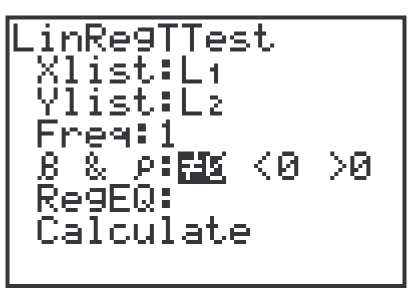
Before you begin this section, be cautioned. For some new calculators, the Diagonostics must be turned on. If this is not done, the value of *r* will not appear on the screen. To do this, follow the keystrokes below:

2^{nd} >> Catalog (above the number 0 key) >> arrow down to Diagnostic ON.

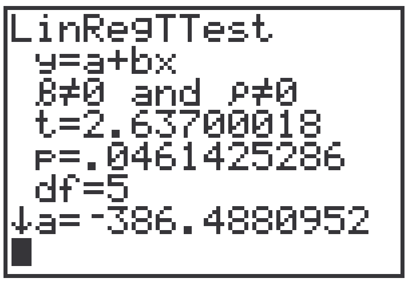
EXAMPLE: Determine the regression equation for the Seattle Mariners data. Let the x (independent) variable be the height and y (dependent) variable be the weight.

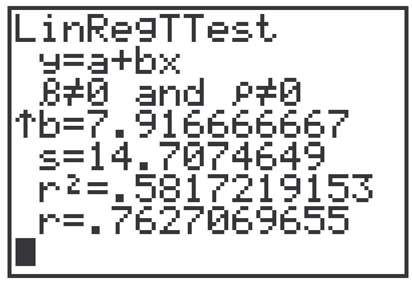
Enter your x values in *L1* and your y values in *L2*.

STAT >> arrow twice to the right for TESTS >> arrow down until you reach option E (LinRegTTest) >> Fill in all the necessary fields. See the screen below.



Arrow down to Calculate and then hit ENTER.





a is the value of your y-intercept
b is the slope
s is the standard error of the estimate
r^2 is the coefficient of determination
r linear correlation coefficient

We can determine that there is significant linear correlation because the correlation coefficient r = 0.763 is greater than the critical value from table A-6, which is r = 0.754. Therefore, we proceed to find the regression equation to predict a Seattle Mariner's weight from his height as follows:

*weight = -386.49 + 7.92 * height*

r^2 *= .58, which implies that 58% of the total variation in a Seattle Mariner's weight can be explained by the regression equation.*

CHAPTER 10 SECTION 10-3:

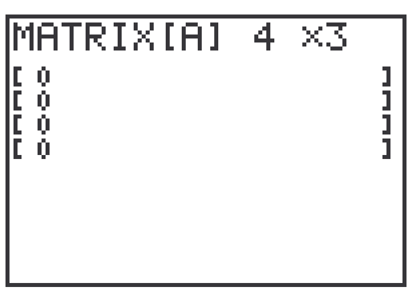
Chi-Square Test for Independence

EXAMPLE: The table below list the levels of education based on age. Test the claim that age and level of education are independent of each other. The data is from [*http://lib.stat.cmu.edu/DASL/Datafiles/Educationbyage.html*](http://lib.stat.cmu.edu/DASL/Datafiles/Educationbyage.html)

	25-34	35-44	45-54	Total
Did not complete high school	5416	5030	5777	16223
Completed high school	16431	1855	9435	27721
College, 1-3 years	8555	5576	3124	17255
College, 4 or more years	9771	7596	3904	21271
Totals	40173	20057	22240	82470

The first thing you need to do is enter the observed values in matrix [A]. To enter the observed data in matrix [A], select MATRIX (the key is in the third row, second column) >> arrow twice to the right to select EDIT >> now hit ENTER.

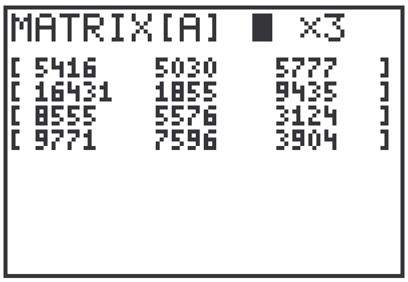
Your next step is to set up the dimension of the matrix. Since we have 4 rows of data and 3 columns of data (ignore the totals), type in 4 >> ENTER >> 3 >> ENTER. You should have a screen like the one below.



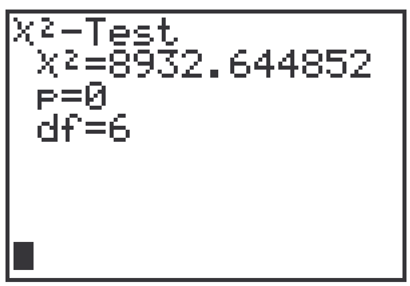
From here, just type in the data values, row by row. Hit ENTER after each value. There is no need to calculate the expected values. The calculator will do it automatically.

The matrix for the observed values are listed below.

OBSERVED



To perform the χ^2 test on the TI-83, select STAT >> arrow to TEST >> arrow down to you get to χ^2-Test… (option C) >> hit ENTER >> arrow down to Calculate and hit ENTER again. You should have the screen below.



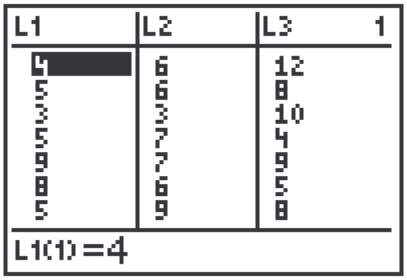
Since the p-value is 0, we can reject the null hypothesis that age and level of education are independent of each other.

CHAPTER 11 SECTION 11-2:
One-Way Analysis of Variance (ANOVA)

EXAMPLE: Researchers at Purdue University conducted an experiment to compare three different methods of reading instruction, Basal, DRTA, and Strat. Listed below are their results. At the 0.05 level of significance, test the claim that for the second Posttest score reading comprehension measure, there are no differences among the average scores of the methods.
Data obtained from
http://lib.stat.cmu.edu/DASL/Datafiles/ReadingTestScores.html

Basal	DRTA	Strat
4	6	12
5	6	8
3	3	10
5	7	4
9	7	9
8	6	5
5	9	8
5	5	12
7	7	11
7	6	11
4	5	10
4	0	9
6	6	10
8	6	1
4	7	9
10	11	13
3	6	9
5	6	7
5	6	7
3	8	5
4	8	8
8	6	6

The first thing we need to do is enter the data in three separate list. To enter data into a list, hit the STAT button (to get into the Statistics menu), then hit the ENTER key (to select the EDIT option in the EDIT menu). Now simply enter the data in each of the respective list.



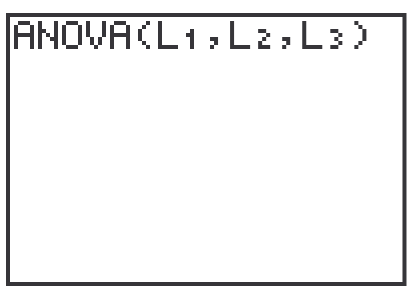
Once the data is entered into the calculator, we need to decide what kind of test is to be done and then determine the null and alternative hypothesis. Since we are looking the mean of three different groups, the ANOVA method applies.

H_0 : *There is no difference between the three population means.*

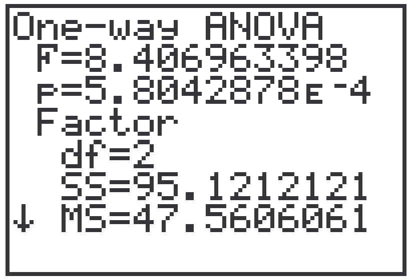
H_1 : *At least two means are different*

To perform the ANOVA test, hit the STAT button, followed by the right arrow twice. TEST should be highlighted. Arrow down until you arrive at *ANOVA(* It is option F. Hit the ENTER key. You will notice that you are now back on the main screen. Type in the names of your list, separated by a comma. For this example, your data should be in L1, L2, and L3.

The syntax template is ANOVA (List names, separated by commas)



After you have typed in the names of the list, close the parenthesis and hit the ENTER key. Your screen should now look like the one below.



The p-value for this question is p = 5.80E-4. YOU CANNOT IGNORE THE E-4. It is scientific notation for the number p = 0.000580. Since the p-value is less than our level of significance, we can reject the null hypothesis. The evidence suggest we can reject the claim that the population means are all equal.