

Statistics Calculator Packet - Old OS



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To “Seed” Your Calculator

- Input a numeric value between 5,000 and 10,000, and make sure it’s not “tidy” (in other words, don’t use exactly 5,000, but something like 5,397).
- Press the STO> key.
- Press MATH and use the right arrow key to scroll over to the PRB menu.
- Press the down arrow key to highlight rand and press ENTER.
- Press ENTER again. The calculator will display the same number you used from step 1 above, but it is now “seeded.”

Special note about seeding: You only need to seed your calculator once, and it will stay that way until you remove the batteries or clear the RAM. If you remove the batteries or clear the RAM, you will need to seed your calculator again.

To Generate Pseudo-Random Integers

1. Once you have first seeded your calculator, if necessary, press MATH and use the right arrow key to scroll over to the PRB menu.
2. Highlight randInt and press ENTER.
3. Your screen should now display the prompt randInt(.
4. Enter the range of data values you want the random numbers to be generated from, separated by a comma. Then, use one more comma and select the amount of numbers you want it to return at one time. For example, randInt(1,6,3) will generate 3 random integers between 1 and 6, while randInt(0,99,5) will generate 5 random integers between 0 and 99.
5. Make sure to close the parentheses and press ENTER. The calculator should return the requested amount of random numbers. If you keep pressing ENTER, this will create additional "trials."

To Input Lists of Data

1. Press STAT.
2. Highlight EDIT and press ENTER.
3. Clear existing data from lists by using the up arrow key to scroll up until the name of the list is highlighted. Press CLEAR and then ENTER.
4. Input data values into the list by typing in the numbers, pressing ENTER between each data value.
5. When all of the data values are entered, press 2nd and MODE to exit back to the main screen.

Special note about inputting lists

If you are missing lists (L1, L2, etc...) press STAT, and use the down arrow key to scroll down until SetUpEditor is highlighted. Press ENTER twice. The calculator will display the word "Done" and your lists will be back

To Sort Lists of Data

1. Input a list of data, following the procedure above.
2. Press STAT.
3. Select either SortA (this will sort the list from low to high) or SortD (this will sort the list from high to low), and press ENTER.
4. Input the name of the list where the data are stored by pressing 2nd and then the number of the list you want to sort.
5. Close the parentheses and press ENTER.
6. The calculator will display the word Done, and if you go back into STAT and EDIT, you will see that your list has been sorted.

To Make a Histogram

1. Enter the data into a list using the procedure above.
2. Press 2^{nd} and $Y=$. This will take you to the STAT PLOT menu.
3. Press ENTER when the desired plot number is highlighted (you might want to make sure other plots are turned off).
4. Select the word ON and press ENTER.
5. Press the down arrow key, and select the third icon in the first row (it will look like a histogram) and press ENTER.
6. Input the list in which the data are stored next to Xlist.
7. If your data are all stored in one list, Freq should be set to 1. If you have a list of frequencies associated with your list of data, you will need to input the name of this list on the Freq line.
8. Press WINDOW.
9. Set up the window as follows:
10. Xmin: lowest class boundary
11. Xmax: highest class boundary
12. Xscl: class width
13. Ymin: 0
14. Ymax: a little higher than the largest frequency
15. Yscl: Could use a lot of things here, but 1 will work
16. Xres: 1
17. Press GRAPH. The calculator should now display the desired histogram. You can view details about each of the bins by pressing TRACE.

To Make a Time-Series Graph

1. Enter the data into a list using the procedure above.
2. Press 2^{nd} and Y=. This will take you to the STAT PLOT menu.
3. Press ENTER when the desired plot number is highlighted (you might want to make sure other plots are turned off).
4. Select the word ON and press ENTER.
5. Press the down arrow key, and select the second icon on the first row. It will look like a time-series graph.
6. Input the list in which the x-data are stored next to Xlist.
7. Input the list in which the y-data are stored next to Ylist.
8. Select the mark you would like the calculator to use for the data points.
9. Press ZOOM and the number 9 (this is ZoomStat - statistical zoom).
10. The calculator should now display the desired time-series graph.

To Compute One Variable Statistics for Data in a Single List

1. Input your data into a list using the procedure above.
2. Press STAT, then press the right arrow key to scroll over to the CALC menu.
3. Highlight 1-VarStats and press ENTER.
4. Press 2nd and one of the numbers 1 through six to indicate in which list your data are stored.
5. Press ENTER. The calculator should now display the desired statistics.

To Compute One Variable Statistics for Data in Two Lists

Special note about data in two lists: You would use this method to compute a weighted average, or to compute one variable statistics when you have data in one list and associated frequencies in another list.

1. Input your data using the procedure above, and input the weights/frequencies associated with the data into another list.
2. Press STAT, then press the right arrow key to scroll over to the CALC menu.
3. Press ENTER.
4. Press 2nd and one of the numbers 1 through six to indicate in which list your data are stored.
5. Press the comma key.
6. Press 2nd and one of the numbers 1 through 6 to indicate in which list your weights/frequencies are stored.
7. Press ENTER. The calculator should now display the desired statistics.

To Create a Box and Whisker Plot

1. Enter the data into a list using the procedure above.
2. Press 2nd and Y=. This will take you to the STAT PLOT menu.
3. Press ENTER when the desired plot number is highlighted (you might want to make sure other plots are turned off).
4. Select the word ON and press ENTER.
5. Press the down arrow key, and then press the right arrow key until the first icon on the second row is highlighted (it will look like a box and whisker plot with some dots) and press ENTER.
6. Input the list in which the data are stored next to Xlist.
7. If the data are in a single list, Freq should be set to 1. If your data has weights/frequencies associated with it, input the name of this list next to Freq.
8. Select the mark you would like the calculator to use for outliers.
9. Press ZOOM and 9 (ZoomStat). The calculator will now display the desired histogram. You can also press TRACE to view the values from the graph.

To Calculate a Factorial

1. Input the number that you want to compute the factorial of.
2. Press MATH and use the right arrow key to scroll over to the PRB menu.
3. Highlight ! (the factorial - looks like an exclamation point) and press ENTER.
4. Press ENTER to compute the factorial.

To Calculate the number of Permutations or Combinations

1. Input the total number of objects, n .
2. Press MATH and use the right arrow key to scroll over to the PRB menu.
3. Highlight either nPr or nCr and press ENTER.
4. Input the number of objects you're choosing, r .
5. Press ENTER to compute the value.

To Create a Histogram of a Probability Distribution

1. Input the values of the random variable into L_1 (remember to use the class midpoints for continuous random variables).
2. Input the associated percentages, formatted as decimals, into L_2 .
3. Press 2nd Y= and ENTER to edit stat plot 1.
4. Press ENTER when the word ON is highlighted to turn on the stat plot.
5. Select the histogram graphic and press ENTER.
6. Set the Xlist: to L_1 .
7. Set the Freq: to L_2 .
8. Press WINDOW.
9. Set up the window as follows:
10. Xmin: lowest x-value from L_1
11. Xmax: a little higher than the highest x-value from L_1
12. Xscl: the "increment of change" of the x-variable in L_1
13. Ymin: 0
14. Ymax: a little higher than the maximum probability from L_2
15. Yscl: Could use a lot of things here, but 0.05 works pretty well
16. Xres: 1
17. Press GRAPH. The calculator should now display the graph of the specified binomial distribution.

To Calculate the Binomial Probability of a Single Value (exactly r successes)

1. Press 2nd VARS to get to the DISTR menu.
2. Use the down arrow key to scroll down until binompdf is highlighted and press ENTER.
3. Input the number of trials, n .
4. Press the comma key.
5. Input the probability of success on a single trial, p , formatted as a decimal.
6. Press the comma key.
7. Input the number of successes, r .
8. Press the) key.
9. Press ENTER to compute the probability.

To Calculate the Binomial Probability of a Range of Values (r or fewer successes)

1. Press 2nd VARS to get to the DISTR menu.
2. Press the down arrow key to scroll down until binomcdf is highlighted and press ENTER.
3. Input the number of trials, n.
4. Press the comma key.
5. Input the probability of success on a single trial, p, formatted as a decimal.
6. Press the comma key.
7. Input the number of successes, r.
8. Press the) key.
9. Press ENTER to compute the probability.

To Graph a Binomial Distribution

1. Input the possible number of successes (from zero to n) in L_1 .
2. Scroll right and up, using the arrow keys, until the L_2 is highlighted.
3. Press 2nd VARS and select binompdf from the DISTR menu.
4. Input the value for n , a comma, the value for p formatted as a decimal, a comma, L_1 , and a closing parenthesis. The command should look like $L_2=\text{binompdf}(n,p,L_1)$.
5. Press ENTER, and the calculator will store the probabilities attached to each number of successes in L_2 .
6. Press 2nd Y= to go to the STAT PLOT menu.
7. Press ENTER to select plot 1.
8. Press ENTER when the word ON is highlighted to turn the plot on.
9. Use the arrow keys to scroll over until the histogram graphic is highlighted, and press ENTER.
10. Set the Xlist to L_1 .
11. Set the Freq to L_2 .
12. Press WINDOW.
13. Set up the window as follows:
14. Xmin: -0.5
15. Xmax: $n+0.5$
16. Xscl: 1
17. Ymin: 0
18. Ymax: a little higher than the maximum probability from L_2
19. Yscl: Could use a lot of things here, but 0.05 works pretty well
20. Xres: 1
21. Press GRAPH. The calculator should now display the graph of the specified binomial distribution.

To Compute One Variable Statistics for a Probability Distribution

1. Input the values of the random variable in L_1 , and the associated probabilities in L_2 , using the procedure above for entering lists of data.
2. Follow the procedure above for computing one variable statistics for data in two lists.

To Graph a Normal Distribution

1. Press the Y= key.
2. Press 2nd VARS to get to the DISTR menu.
3. Select normalpdf and press ENTER.
4. Press the X key.
5. Press the comma key.
6. Input the desired mean.
7. Press the comma key.
8. Input the desired standard deviation.
9. Press the) key.
10. Press the WINDOW key.
11. Set Xmin to $\mu - 3\sigma$ and Xmax to $\mu + 3\sigma$.
12. Press the ZOOM key.
13. Press the down arrow key until ZoomFit is highlighted and press ENTER.
14. The calculator should now display the desired graph.

To Compute the Areas Under the Normal Curve

1. Press 2nd VARS to get to the DISTR menu.
2. Press the down arrow key to highlight normalcdf, and press ENTER.
3. Input the left endpoint, and press the comma key.
4. Input the right endpoint and press).
5. Press ENTER. The calculator should display the area under the normal curve between the two specified endpoints (remember: use -100 for an infinite left endpoint, and 100 for an infinite right endpoint).

To Find a z-value from the Area to the Left of z

1. Press 2nd VARS to get to the DISTR menu.
2. Press the down arrow key to highlight invNorm, and press ENTER.
3. Input the percentage, expressed as a decimal, and press).
4. Press ENTER. The calculator should display the desired z-value.

To Graph a Normal Quantile Plot

1. Enter the data into a list using the procedure above.
2. Press 2^{nd} and $Y=$. This will take you to the STAT PLOT menu.
3. Press ENTER when the desired plot number is highlighted (you might want to make sure other plots are turned off).
4. Select the word ON and press ENTER.
5. Press the down arrow key, and then press the right arrow key until the last icon on the second row is highlighted, and press ENTER.
6. Input the name of the list in which the data are stored next to Data List.
7. Select the axis you would like the calculator to use for the data (usually, X works well).
8. Select the mark you would like the calculator to use for the data points.
9. Press Zoom and 9 (ZoomStat).
10. The calculator should now display the desired normal quantile plot.

To Compute a Confidence Interval for a Mean

1. Press STAT.
2. Press the right arrow key to scroll over to the TESTS menu.
3. Press the down arrow key to scroll down until ZInterval or TInterval is highlighted (whichever is appropriate).
4. Press ENTER.
5. Specify whether you are using raw data, or stats (if you are using raw data, you need to enter that data into one of the lists before attempting to create the interval).
6. *If you're using raw data*, input the location of the data, the frequency of the data points contained in the list (usually 1), and the confidence level, formatted as a decimal.
7. *If you're using stats*, enter the sample mean, the population or sample standard deviation (whichever is appropriate), the sample size, and the confidence level, formatted as a decimal.
8. Highlight the word Calculate and press ENTER.
9. The calculator should now display the desired confidence interval.

To Compute a Confidence Interval for a Proportion

1. Press STAT.
2. Press the right arrow key to scroll over to the TESTS menu.
3. Press the down arrow key to scroll down until 1-PropZInt is highlighted.
4. Press ENTER.
5. Input the number of “successes” next to the x. Remember: The number of successes must be entered as a whole number.
6. Input the sample size next to the n.
7. Input the confidence level as a decimal.
8. Highlight the word Calculate and press ENTER.
9. The calculator should now display the desired confidence interval.

To Compute a Confidence Interval for the Difference Between Two Means (Independent Samples)

1. Press STAT.
2. Press the right arrow key to scroll over to the TESTS menu.
3. Press the down arrow key to scroll down until 2-SampZInt or 2-SampTInt is highlighted (whichever is appropriate).
4. Press ENTER.
5. Specify whether you are using raw data, or stats (if you are using raw data, you need to enter that data into two of the lists, one for each sample, before attempting to create the interval).
6. *If you're using raw data*, input the locations of the data, the frequency of the data points contained in each list (usually 1), the confidence level formatted as a decimal, and tell the calculator whether or not to use pooling, if necessary.
7. *If you're using stats*, input the mean, standard deviation, and sample size for each of the two samples, the confidence level formatted as a decimal, and tell the calculator whether or not to use pooling, if necessary.
8. Highlight the word Calculate and press ENTER.
9. The calculator should now display the desired confidence interval.

To Compute a Confidence Interval for the Difference Between Two Proportions (Independent Samples)

1. Press STAT.
2. Press the right arrow key to scroll over to the TESTS menu.
3. Press the down arrow key to scroll down until 2-PropZInt is highlighted.
4. Press ENTER.
5. Input the number of “successes” for the first group next to the x_1 (remember: this must be a whole number).
6. Input the sample size for the first group next to the n_1 .
7. Input the number of “successes” for the second group next to the x_2 .
8. Input the sample size for the second group next to the n_2 .
9. Input the desired confidence level, formatted as a decimal.
10. Highlight the word Calculate and press ENTER.
11. The calculator should now display the desired confidence interval.

To Compute a Confidence Interval for Dependent Samples (Paired Data)

1. Store your data in two lists, L_1 and L_2 for example.
2. Create a list of the differences by scrolling over and up until L_3 is highlighted. Then press 2^{nd} 1 minus 2nd 2, and press ENTER. This stores a list of differences in L_3 .
3. Press STAT.
4. Press the right arrow key to scroll over to the TESTS menu.
5. Press the down arrow key to scroll down until TInterval is highlighted.
6. Press ENTER.
7. Highlight Data.
8. Press ENTER.
9. Specify the location of the list of differences (L_3 in our example above), the frequency (usually 1), and the confidence level formatted as a decimal.
10. Highlight Calculate and press ENTER.
11. The calculator should now display the desired confidence interval.

To Test Hypotheses About a Mean

1. Press STAT.
2. Press the right arrow key to scroll over to the TESTS menu.
3. Press the down arrow key to scroll down until Z-Test or T-Test is highlighted (whichever is appropriate).
4. Press ENTER.
5. Specify whether you are using raw data, or stats (if you are using raw data, you need to enter that data into one of the lists before attempting to create the interval).
6. *If you're using raw data*, input the value from the null hypothesis, the location of the data, the frequency of the data points contained in the list (usually 1), and the alternative hypothesis.
7. *If you're using stats*, input the value from the null hypothesis, the mean, the standard deviation, the sample size, and the alternative hypothesis.
8. Highlight the word Calculate and press ENTER.
9. The calculator should now display the results of the hypothesis test.

To Test Hypotheses About a Proportion

1. Press STAT.
2. Press the right arrow key to scroll over to the TESTS menu.
3. Press the down arrow key to scroll down until 1-PropZTest is highlighted.
4. Press ENTER.
5. Input the proportion you used for your null hypothesis (as a decimal) next to the p_0 .
6. Input the number of “successes” next to the x. Remember: The number of successes must be entered as a whole number.
7. Input the sample size next to the n.
8. Select the alternate hypothesis.
9. Highlight Calculate and press ENTER.
10. The calculator should now display the results of the hypothesis test.

To Test Hypotheses About the Difference Between Two Proportions (Independent Samples)

1. Press STAT.
2. Press the right arrow key to scroll over to the TESTS menu.
3. Press the down arrow key to scroll down until 2-PropZTest is highlighted.
4. Input the number of “successes” for the first group next to the x_1 . Remember: this must be a whole number.
5. Input the sample size for the first group next to the n_1 .
6. Input the number of “successes” for the second group next to the x_2 .
7. Input the sample size for the second group next to the n_2 .
8. Select the alternate hypothesis.
9. Highlight Calculate and press ENTER.
10. The calculator should now display the results of the hypothesis test.

To Test Hypotheses About the Difference Between Two Means (Independent Samples)

1. Press STAT.
2. Press the right arrow key to scroll over to the TESTS menu.
3. Press the down arrow key to scroll down until 2-SampZTest or 2-SampTTest is highlighted (whichever is appropriate).
4. Press ENTER.
5. Specify whether you are using raw data, or stats (if you are using raw data, you need to enter that data into two of the lists, one for each sample, before attempting to create the interval).
6. *If you're using raw data*, input the locations of the data, the frequency of the data points contained in each list (usually 1), the confidence level formatted as a decimal, and tell the calculator whether or not to use pooling, if necessary.
7. *If you're using stats*, input the mean, standard deviation, and sample size for each of the two samples, the null hypothesis, and tell the calculator whether or not to use pooling, if necessary.
8. Highlight the word Calculate and press ENTER.
9. The calculator should now display the results of the hypothesis test.

To Test Hypotheses Using Paired (Dependent) Data

1. Store your data in two lists, L_1 and L_2 for example.
2. Create a list of the differences by scrolling over and up until L_3 is highlighted. Then press 2^{nd} 1 minus 2^{nd} 2, and press ENTER. This stores a list of differences in L_3 .
3. Press STAT.
4. Press the right arrow key to scroll over to the TESTS menu.
5. Press the down arrow key to scroll down until T-Test is highlighted and press ENTER.
6. Highlight Data and press ENTER.
7. Specify the mean value from the null hypotheses, the list where the differences are stored, the frequency (usually 1), and the alternate hypothesis.
8. Highlight the word Calculate and press ENTER.
9. The calculator should now display the results of the hypothesis test.

To Turn on the r and R2 Values

1. Press 2^{nd} 0 to enter the CATALOG menu.
2. Press x^{-1} to navigate to the D section of the catalog.
3. Press the down arrow key to scroll down until DiagnosticOn is highlighted.
4. Press ENTER twice.

Special note about turning diagnostic values on

You only need to turn on these values once, and they will remain on until you remove the batteries or clear the RAM. If you remove the batteries or clear the RAM, you will need to repeat this process.

To Create a Scatterplot

1. Input the data into two lists (one for the x-values and one for the y-values) using the procedure above.
2. Press 2^{nd} and Y=. This will take you to the STAT PLOT menu.
3. Press ENTER when the desired plot number is highlighted (you might want to make sure other plots are turned off).
4. Select the word ON and press ENTER.
5. Press the down arrow key, and select the first icon on the first row. It will look like a scatterplot.
6. Input the list in which the x-data are stored next to Xlist.
7. Input the list in which the y-data are stored next to Ylist.
8. Select the mark you would like the calculator to use for the data points.
9. Press ZOOM and the number 9 (this is ZoomStat - statistical zoom).
10. The calculator should now display the desired scatterplot.

To Compute a Linear Regression and Diagnostics

Special note about linear regression and diagnostics: This process will allow you to compute the values for the linear regression, the correlation coefficient, and the coefficient of determination.

1. Make sure you have already turned on your diagnostics, as described above.
2. Input the data points into two lists (one for the x-values and one for the y-values) using to the procedure above.
3. Press STAT.
4. Press the right arrow key to scroll over to the CALC menu.
5. Press the down arrow key to scroll down until LinReg(a+bx) is highlighted and press ENTER.
6. Press 2nd and a number 1 through six to denote in which list your x-values are stored.
7. Press the comma key.
8. Press 2nd and a number 1 through 6 to denote in which list your y-values are stored.
9. Press ENTER. The calculator should display the desired values.

To Get the LinReg Line to Display With the Scatterplot

1. Follow steps 1 through 8 above.
2. Press the comma key.
3. Press VARS.
4. Press the right arrow key to navigate to the Y-VARS menu.
5. Press ENTER three times.
6. Press GRAPH to view the linear regression line with the scatterplot.

To Compute Two Variable Statistics

1. Input the data into two lists (one for the x-values and one for the y-values) using the procedure above.
2. Press STAT.
3. Press the right arrow key to scroll over to the CALC menu.
4. Press the down arrow key until 2-Var Stats is highlighted, and press ENTER.
5. Press 2nd and one of the numerals 1 through 6 to indicate in which list your x-values are stored.
6. Press the comma key.
7. Press 2nd and one of the numerals 1 through 6 to indicate in which list your y-values are stored.
8. Press ENTER. The calculator should now display the desired statistics.

To Compute Residuals

1. Input the data into two lists (L_1 for the x-values and L_2 for the y-values, for example), and calculate the linear regression equation, using the procedure above.
2. Select another list in which to store the residual values (L_3 , for example) by using the arrow keys to scroll over and up until the name of the list is highlighted.
3. Press 2nd STAT to navigate to the List menu.
4. Select the RESID option by scrolling down to it and pressing ENTER.
5. Press ENTER again to populate your selected list with the residual values.

Special note about computing residuals

You MUST compute the LinReg for your current set of data before asking the calculator to provide the residuals.

To Graph a Residual Plot

1. Compute the residuals using the procedure above.
2. Press 2nd Y= to navigate to the STAT PLOT menu.
3. Select a plot and make sure it is turned on.
4. Select the first icon (scatterplot) next to "Type."
5. Set the XList to the list where the x-values are stored.
6. Set the YList to the list where the **residuals** are stored.
7. Press ZOOM and select option 9 (ZoomStat).
8. The calculator should now display the desired residual plot.

To Test Hypotheses About ρ and β

1. Input the data into two lists (one list for the x-values and one for the y-values).
2. Press STAT.
3. Press the right arrow key to scroll over to the TESTS submenu.
4. Use the down arrow key to scroll down until LinRegTTest is highlighted and press ENTER.
5. Select your x list and y list (the two lists where your data are stored).
6. Select the frequency (usually 1).
7. Select your alternate hypothesis.
8. Highlight the word Calculate and press ENTER.
9. The calculator should now display the results of the hypothesis test.

To Compute a Confidence Interval for β

1. Input the data into two lists (one list for the x-values and one for the y-values).
2. Press STAT.
3. Press the right arrow key to scroll over to the TESTS submenu.
4. Press the down arrow key to scroll down until LinRegTInt is highlighted and press ENTER.
5. Select your x list and y list (the two lists where your data are stored).
6. Select the frequency (usually 1).
7. Input your confidence level, formatted as a decimal.
8. Highlight the word Calculate and press ENTER.
9. The calculator should now display the desired confidence interval.