TI CALCULATOR TECHNOLOGY STEP-BY-STEP

STATISTICS: INFORMED DECISIONS USING DATA

SEVENTH EDITION

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TI Technology Step-by-Step

Section 1.3 Obtaining a Simple Random Sample

TI-83/84 Plus

1. Enter any nonzero number (the seed) on the HOME screen.
2. Press the STO► button.
3. Press the MATH button.
4. Highlight the PRB menu and select 1:rand.
5. From the HOME screen press ENTER.
6. Press the MATH button. Highlight the PRB menu and select 5:randInt(.
7. With randInt(on the HOME screen, enter 1, *N*), where *N* is the population size. For example, if *N* = 500, enter the following:

   randInt(1,500)

   Press ENTER to obtain the first individual in the sample. Continue pressing ENTER until the desired sample size is obtained.

TI-84 Plus C/CE

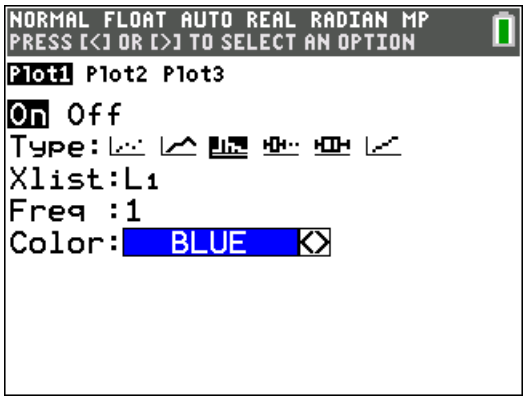
1. Enter any nonzero number (the seed) on the HOME screen.
2. Press the STO ▶ button.
3. Press the MATH button.
4. Highlight the PROB menu and select 1: rand.
5. From the HOME screen press ENTER.
6. Press the MATH button.
7. Highlight the PROB menu and select randIntNoRep(.
8. Type in the values for lower, upper, and *n*. Note: Lower should be 1 in most cases; upper will be *N* where *N* is the population size; *n* is the desired sample size.
9. Highlight Paste. Press ENTER. Press ENTER a second time from the HOME screen.

Section 2.2 Organizing Quantitative Data: The Popular Displays

Histograms

1. Enter the raw data in L1 by pressing STAT and selecting 1: Edit.
2. Press 2nd Y = to access the StatPlot menu. Select 1: Plot1.
3. Place the cursor on "ON" and press ENTER.

4. Place the cursor on the histogram icon (see the figure) and press ENTER. Press 2nd QUIT to exit the Plot 1 menu.
5. Press WINDOW. Set Xmin to the lower class limit of the first class. Set Xmax to the lower class limit of the class following the class containing the largest value. For example, if the first class is 0–9, set Xmin to 0. If the class width is 10 and the last class is 90–99, set Xmax to 100. Set Xscl to the class width. Set Ymin to 0. Set Ymax to a value larger than the frequency of the class with the highest frequency.
6. Press GRAPH.



Helpful Hints: To determine each class frequency, press TRACE and use the arrow keys to scroll through each class. If you decrease the value of Ymin to a value such as - 5, you can see the values displayed on the screen easier. The TI graphing calculators do not draw dot plots.

Section 2.3 Additional Displays of Quantitative Data

Frequency Polygons, Ogives, and Time-Series Plots

1. Enter the values for the *x*-axis in L1 and the values for the *y*-axis in L2 by pressing STAT and selecting 1: Edit.
2. Press 2nd Y = to access the StatPlot menu. Select 1:Plot1.
3. Place the cursor on "ON" and press ENTER.
4. Place the cursor on the line plot icon and press ENTER. Press 2nd QUIT to exit the Plot1 menu.
5. Press WINDOW. Set Xmin to the smallest value in L1 and set Xmax to the largest value in L1. Set Ymin to the smallest value in L2 and set Ymax to the largest value in L2. Press GRAPH.

Section 3.1 Measures of Central Tendency

Determining the Mean and Median

1. Enter raw data in L1 by pressing STAT and then selecting 1:Edit.
2. Press STAT, highlight the CALC menu, and select 1:1-Var Stats. In the menu, select L1 for List. Clear the entry in FreqList:. Highlight Calculate and press ENTER.

Section 3.2 Measures of Dispersion

Determining the Range, Variance, and Standard Deviation

1. Enter raw data in L1 by pressing STAT and then selecting 1:Edit.

2. Press STAT, highlight the CALC menu, and select 1:1-Var Stats. In the menu, select L1 for List. Clear the entry in FreqList:. Highlight Calculate and press ENTER.

Section 3.3 Measures of Central Tendency and Dispersion from Grouped Data

Determining the Mean and Standard Deviation from Grouped Data

1. Enter the class midpoint in L1 and the frequency or relative frequency in L2 by pressing STAT and then selecting 1 : Edit.
2. Press STAT, highlight the CALC menu, and select 1 : 1-Var Stats. In the menu, select L1 for List. Select L2 for FreqList:. Highlight Calculate and press ENTER.

Section 3.4 Measures of Position and Outliers

Determining Quartiles

1. Enter raw data in L1 by pressing STAT and then selecting 1:Edit.
2. Press STAT, highlight the CALC menu, and select 1:1-Var Stats. In the menu, select L1 for List. Clear the entry in FreqList:. Highlight Calculate and press ENTER.

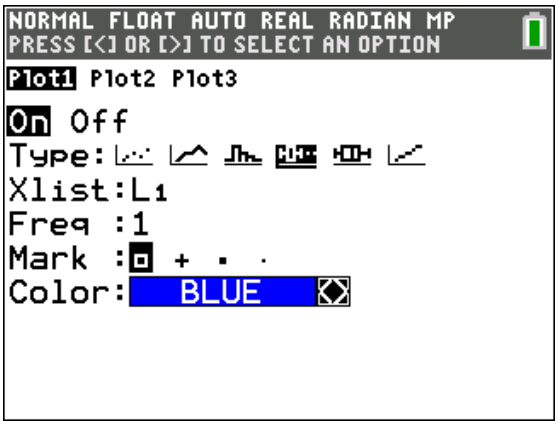
Section 3.5 The Five-Number Summary and Boxplots

Determining the Five-Number Summary

1. Enter raw data in L1 by pressing STAT and then selecting 1:Edit.
2. Press STAT, highlight the CALC menu, and select 1:1-Var Stats. In the menu, select L1 for List. Clear the entry in FreqList:. Highlight Calculate and press ENTER.

Drawing Boxplots

1. Enter the raw data into L1.
2. Press 2nd Y= and select 1:Plot 1.
3. Turn the plots ON. Use the cursor to highlight the modified boxplot icon. Your screen should appear as shown in the figure.
4. Press ZOOM and select 9:ZoomStat.



Section 4.1 Scatter Diagrams and Correlation

Scatter Diagrams

1. Enter the explanatory variable in L1 and the response variable in L2.
2. 2. Press 2nd Y= to bring up the StatPlot menu. Select 1: Plot1.
3. Turn Plot 1 on by highlighting the On button and pressing ENTER.

4. Highlight the scatter diagram icon and press ENTER. Be sure that Xlist is L1 and Ylist is L2.
5. Press ZOOM and select 9: ZoomStat.

Correlation Coefficient

1. Enter the explanatory variable values in L1 and the response variable values in L2.
2. Turn the diagnostics on by selecting the catalog (2nd 0). Scroll down and select DiagnosticOn. Press ENTER twice to activate diagnostics (this step needs to be done only once).
3. From the HOME screen, press STAT, highlight CALC, and select 4: LinReg(ax + b) . Select L1 for Xlist and L2 for Ylist. Highlight Calculate and press ENTER.

Section 4.2 Least-Squares Regression

Determining the Least-Squares Regression Line

1. Enter the explanatory variable values in L1 and the response variable values in L2.
2. Turn the diagnostics on by selecting the catalog (2nd 0). Scroll down and select DiagnosticOn. Press ENTER twice to activate diagnostics (this step needs to be done only once).
3. From the HOME screen, press STAT, highlight CALC, and select 4: LinReg(ax + b) . Select L1 for Xlist and L2 for Ylist. Highlight Calculate and press ENTER.

Section 4.3 Diagnostics on the Least-Squares Regression Line

The Coefficient of Determinations, R^2

1. Enter the explanatory variable values in L1 and the response variable values in L2.
2. Turn the diagnostics on by selecting the catalog (2nd 0). Scroll down and select DiagnosticOn. Press ENTER twice to activate diagnostics (this step needs to be done only once).
3. From the HOME screen, press STAT, highlight CALC, and select 4: LinReg(ax + b) . Select L1 for Xlist and L2 for Ylist. Highlight Calculate and press ENTER.

Residual Plots

1. Enter the raw data in L1 and L2. Obtain the least-squares regression line.
2. Access STAT PLOT. Select Plot1. Choose the scatter diagram icon and let XList be L1. Let YList be RESID by moving the cursor to YList, pressing 2nd STAT, and choosing the list titled RESID under the NAMES menu.
3. Press ZOOM and select 9: ZoomStat.

Section 5.5 Counting Techniques

Factorials

1. To compute 7!, type 7 on the HOME screen.
2. Press MATH, then highlight PRB (or PROB on a TI-84 Plus C or CE), and then select 4: ! With 7! on the HOME screen, press ENTER again.

Permutations and Combinations

1. To compute ${}_7P_3$, type 7 on the HOME screen.
2. Press MATH, then highlight PRB (or PROB on a TI-84 Plus C or CE), and then select 2: nPr.
3. Type 3 on the HOME screen, and press ENTER.

Note: To compute ${}_7C_3$, select 3: *nCr* instead of 2: *nPr* .

Section 5.6 Simulating Probability Experiments

Random Integers

Select MATH. Highlight PROB and select 5: randInt(. Type the lower limit, upper limit, and number of integers, n , to generate. Press STO and then 2ND 1 (to store the data in list L1). Press ENTER.

Section 6.1 Discrete Random Variables

Finding the Mean and Standard Deviation of a Discrete Random Variable

1. Enter the values of the random variable in L1 and their corresponding probabilities in L2.
2. Press STAT, highlight CALC, select 1: 1-VAR Stats, and press ENTER.
3. Select L1 for List:; Select L2 for FreqList:. Highlight Calculate and press ENTER.

Section 6.2 The Binomial Probability Distribution

Computing *P*(*x*)

1. Press 2nd VARS to access the probability distribution menu.
2. Highlight binompdf(and press ENTER.
3. Enter the number of trials n, the probability of success p, and the number of successes x . Highlight Paste and press ENTER. For example, with $n = 15$, $p = 0.3$, and $x = 8$, you should see the following on the HOME screen: **binompdf(15,0.3,8)** Then press ENTER.

Computing *P*(*X* ≤ *x*)

1. Press 2nd VARS to access the probability distribution menu.
2. Highlight binomcdf(and press ENTER.
3. Enter the number of trials n, the probability of success p, and the number of successes x . Highlight Paste and press ENTER. For example, with $n = 15$, $p = 0.3$, and $x \leq 8$, you should see the following on the HOME screen: **binomcdf(15,0.3,8)** Then press ENTER.

Section 6.3 The Poisson Probability Distribution

Computing $P(x)$

1. Press 2nd VARS to access the probability distribution menu.
2. Highlight poissonpdf(and press ENTER.
3. After λ, enter the value of μ, followed by the number of successes, x . Highlight Paste and press ENTER. For example, with $\lambda = 10$ and $x = 4$, you should see the following on the HOME screen: **poissonpdf(10,4)**

   Then press ENTER.

Computing $P(X \leq x)$

1. Press 2nd VARS to access the probability distribution menu.
2. Highlight poissoncdf(and press ENTER.
3. After λ, enter the value of μ, followed by the number of successes, x . Highlight Paste and press ENTER. For example, with $\lambda = 10$ and $x = 4$, you should see the following on the HOME screen: **poissoncdf(10,4)**

   Then press ENTER.

Section 7.2 Applications of the Normal Distribution

Finding Area Under the Normal Curve

1. From the HOME screen, press 2nd VARS to access the DISTRibution menu.
2. Select 2:normalcdf(.
3. Enter the *lowerbound*, *upperbound* , μ, and σ. Highlight. Paste and press ENTER. Press ENTER again with the formula on the HOME screen.

Note: When there is no lowerbound, enter - 1E99. When there is no upperbound, enter 1E99. The E shown is scientific notation; it is selected by pressing 2nd then , (comma).

Finding Normal Values Corresponding to an Area

1. From the HOME screen, press 2nd VARS to access the DISTRibution menu.
2. Select 3:invNorm(.
3. Enter the *area left* , μ, and σ. Highlight Paste and press ENTER. Press ENTER again with the formula on the HOME screen.

Section 7.3 Assessing Normality

Normal Probability Plots

1. Enter the raw data into L1.
2. Press 2nd Y= to access STAT PLOTS.
3. Select 1:Plot1.
4. Turn Plot1 on by highlighting On and pressing ENTER. Press the down-arrow key. Highlight the normal probability plot icon. Press ENTER to select this plot type. The Data List should be set at L1. The Data Axis should be the *x*-axis.
5. Press ZOOM and select 9:ZoomStat.
6. Once you have the graph, TRACE to find the values of the observations and the corresponding normal scores. Enter these observations into L1 and L2. Find the correlation coefficient for this data.

Section 9.1 Estimating a Population Proportion

Confidence Interval for a Population Proportion

1. Press STAT, highlight TESTS, and select A: 1-PropZInt… .
2. Enter the values of *x* and *n* .
3. Enter the confidence level following C-Level.
4. Highlight Calculate: press ENTER.

Section 9.2 Estimating a Population Mean

Confidence Interval for a Population Mean

1. If necessary, enter raw data in L1.
2. Press STAT, highlight TESTS, and select 8:TInterval.
3. If the data are raw, highlight Data. Make sure List is set to L1 and Freq to 1. If summary statistics are known, highlight Stats and enter the summary statistics.
4. Enter the confidence level following C-Level :.
5. Highlight Calculate; press ENTER.

Section 10.2 Hypothesis Tests for a Population Proportion

1. Press STAT, highlight TESTS, and select 5 : 1-PropZTest.
2. For the value of p_0 , enter the value of the population proportion stated in the null hypothesis.
3. Enter the number of successes, x, and the sample size, n.
4. Select the direction of the alternative hypothesis.
5. Highlight Calculate or Draw and press ENTER. Calculate gives the test statistic and P-value. Draw will draw the Z-distribution with the P-value shaded.

Section 10.3 Hypothesis Tests for a Population Mean

1. If necessary, enter raw data in L1.
2. Press STAT, highlight TESTS, and select 2:T-Test.
3. If the data are raw, highlight DATA; make sure that List is set to L1 and Freq is set to 1. If summary statistics are known, highlight STATS and enter the summary statistics. For the value of μ_0, enter the value of the mean stated in the null hypothesis.
4. Select the direction of the alternative hypothesis.
5. Highlight Calculate or Draw and press ENTER. Calculate gives the test statistic and P-value. Draw will draw the Z-distribution with the P-value shaded.

Section 11.1 Inference about Two Population Proportions

Hypothesis Tests

1. Press STAT, highlight TESTS, and select 6:2–PropZTest… .
2. Enter the values of x_1 , n_1 , x_2 , and n_2 .
3. Highlight the appropriate relation between p_1 and p_2 in the alternative hypothesis.
4. Highlight Calculate or Draw and press ENTER. Calculate gives the test statistic and P-value. Draw will draw the Z-distribution with the P-value shaded.

Confidence Intervals

1. Press STAT, highlight TESTS, and select B:2–PropZInt… .
2. Enter the values of x_1 , n_1 , x_2 , and n_2 .
3. Enter the level of confidence after C-Level:.
4. Highlight Calculate and press ENTER.

Section 11.2 Inference about Two Means: Dependent Samples

Hypothesis Tests

1. If necessary, enter raw data in L1 and L2. Let L3 = L1 – L2 (or L2 – L1), depending on how the alternative hypothesis is defined.
2. Press STAT, highlight TESTS, and select 2:T-Test… .

3. If the data are raw, highlight DATA, making sure that List is set to L3 with frequency set to 1. If summary statistics are known, highlight STATS and enter the summary statistics.
4. Highlight the appropriate relation in the alternative hypothesis.
5. Highlight Calculate or Draw and press ENTER. Calculate gives the test statistic and *P*-value. Draw will draw the *Z*-distribution with the *P*-value shaded.

Confidence Intervals

1. If necessary, enter raw data in L1 and L2. Let L3 = L1 – L2 (or L2 – L1), depending on how the alternative hypothesis is defined.
2. Press STAT, highlight TESTS, and select 8:TInterval… .
3. If the data are raw, highlight DATA, making sure that List is set to L3 with frequency set to 1. If summary statistics are known, highlight STATS and enter the summary statistics.
4. Enter the level of confidence after C-Level:.
5. Highlight Calculate and press ENTER.

Section 11.3 Inference about Two Means: Independent Samples

Hypothesis Tests

1. If necessary, enter raw data in L1 and L2.
2. Press STAT, highlight TESTS, and select 4:2-SampTTest… .
3. If the data are raw, highlight DATA, making sure that List1 is set to L1 and List2 is set to L2, with frequencies set to 1. If summary statistics are known, highlight STATS and enter the summary statistics.
4. Highlight the appropriate relation in the alternative hypothesis.
5. Highlight Calculate or Draw and press ENTER. Calculate gives the test statistic and *P*-value. Draw will draw the *Z*-distribution with the *P*-value shaded.

Confidence Intervals

1. If necessary, enter raw data in L1 and L2.
2. Press STAT, highlight TESTS, and select ∅:2-SampTInt… .
3. If the data are raw, highlight DATA, making sure that List1 is set to L1 and List2 is set to L2, with frequencies set to 1. If summary statistics are known, highlight STATS and enter the summary statistics.
4. Enter the level of confidence after C-Level:. Be sure Pooled is set to No.
5. Highlight Calculate and press ENTER.

Section 11.4 Inference about Two Standard Deviations

Hypothesis Tests

1. If necessary, enter raw data in L1 and L2.

2. Press STAT, highlight TESTS, and select E: 2-SampFTest… .
3. If the data are raw, highlight Data and make sure List1 is set to L1 and List2 is set to L2, with frequencies set to 1. If summary statistics are known, highlight Stats and enter the summary statistics.
4. Highlight the appropriate relation between σ_1 and σ_2 in the alternative hypothesis.
5. Highlight Calculate or Draw and press ENTER. Draw draws the *F*-distribution with the *P*-value shaded.

Section 12.1 Goodness-of-Fit Test

1. Enter the observed counts in L1 and enter the expected counts in L2.
2. Press STAT, highlight TESTS, and select D: χ^2GOF-Test . . . .
3. Enter L1 after Observed:, and enter L2 after Expected:. Enter the appropriate degrees of freedom following df:. Highlight either Calculate or Draw and press ENTER.

Section 12.2 Tests for Independence and the Homogeneity of Proportions

Chi-Square Tests

1. Access the MATRIX menu. Highlight the EDIT menu and select 1:[A].
2. Enter the number of rows and columns of the contingency table (matrix).
3. Enter the cell entries for the observed matrix, and press 2nd QUIT.
4. Press STAT, highlight the TESTS menu, and select C: χ^2-Test . . . .
5. With the cursor after Observed:, enter matrix [A] by accessing the MATRIX menu, highlighting NAMES, and selecting 1:[A].
6. With the cursor after Expected:, enter matrix [B] by accessing the MATRIX menu, highlighting NAMES, and selecting 2:[B].
7. Highlight either Calculate or Draw, and press ENTER.

Section 12.3 Inference about Two Population Proportions: Dependent Samples

McNemar's Test

1. By hand, compute the value of the test statistic.
2. Find the area under the chi-square distribution with 1 degree of freedom to the right of the test statistic. To do this, press 2nd VARS to access the DISTRibution menu. Select 8: χ^2cdf(.
3. Enter the lower bound (the value of the test statistic), the upper bound (1E99), and 1 for df (degrees of freedom). Highlight Paste and hit ENTER. From the HOME screen, press ENTER a second time. The result is the *P*-value for the hypothesis test.

Section 13.1 Comparing Three or More Means (One-Way Analysis of Variance)

ANOVA

1. Enter the raw data into L1, L2, L3, and so on, for each sample or treatment.
2. Press STAT, highlight TESTS, and select ANOVA(.
3. Enter the list names for each sample or treatment after ANOVA(. For example, if there are three treatments in L1, L2, and L3, enter

   ANOVA(L1, L2, L3)

   Press ENTER.

Section 14.1 Testing the Significance of the Least-Squares Regression Model

Hypothesis Test on the Slope

1. Enter the explanatory variable in L1 and the response variable in L2.
2. Press STAT, highlight TESTS, and select F:LinRegTTest. . . .
3. Be sure that Xlist is L1 and Ylist is L2. Make sure that Freq: is set to 1. Select the direction of the alternative hypothesis. Place the cursor on Calculate and press ENTER.

Confidence Interval on the Slope

1. Enter the explanatory variable in L1 and the response variable in L2.
2. Press STAT, highlight TESTS, and select G: LinRegTInt . . . .
3. Be sure that Xlist is L1 and Ylist is L2. Make sure the Freq: is set to 1. Select the confidence level. Highlight Calculate. Press ENTER.