Statistics
TI-83 Usage Handout

This handout includes instructions for performing several different functions on a TI-83 calculator for use in Statistics. The "Contents" table below lists the topics covered in this handout. When using the calculator to test a claim, the calculator will return the test statistic needed to help you determine whether or not to reject the null hypothesis. The calculator will not interpret the results or give you the critical values for your problem.

Contents

Sorting Data
- Press **Stat**
- Select **Edit** by pressing **Enter**
- To clear the list L_1 use the up arrow to move up and highlight L_1.
  Press **Clear** and then **Enter**. The entire list should be deleted.
- Enter the data values, one at a time, pressing **Enter** after each value is entered. If you make an error, highlight the one that needs correction by using the up and down arrows. Then retype it or delete the error and retype it.
- To sort your data values into ascending or descending order, press **Stat**. Then choose either **2: Sort A** (for ascending order) or **3: Sort D** (for descending order). Then press 2nd and **1** to get L_1 and then **Enter**. The calculator will say, "*Done*". Press **Stat** and **Enter** to view your list now. This new list will be helpful in finding the mode of a set of values.

Generating Random Numbers from a Range of Values
- Press **Math**
- Select **Prb** by pressing right arrow twice
- Select **5: randInt(**
- Enter the minimum value of the range
- Press comma **,**
- Enter the maximum number of the range
- Press comma **,**
- Enter the number of random numbers needed to generate
- Press **Enter**

If you want to store the randomly generated numbers as list 1:
  o Press **Sto▶**
  o Press 2nd
  o Press **1**
  o Press **Enter**

Finding Mean, Median, Standard Deviation, and Five Number Summary
- Press **Stat**
- Select **Edit** by pressing **Enter**
- To clear the list L_1 use the up arrow to move up and highlight L_1.
  Press **Clear** and then **Enter**. The entire list should be deleted.
- Enter the data values, one at a time, pressing **Enter** after each value is entered. If you make an error, highlight the one that needs correction by using the up and down arrows. Then retype it or delete the error and retype it.
- Press **Stat**
- Use the right arrow key to highlight **Calc**
- Select **1: 1-Var Stats** by pressing **Enter**

- If you want the calculations done on the values stored in L_1, press **Enter**
  If you want the calculations done for another list, you must type the list name and then press **Enter.**
- The calculator will give you a list of numbers including the mean, median, and standard deviation. Use the down arrow key to move through the entire list of numbers.

Finding the Mean, Median, Standard Deviation from a Frequency Table
- Press **Stat**
- Select **Edit** by pressing **Enter**
- To clear the list L_1, use the up arrow to move up and highlight L_1.
  Press **Clear** and then **Enter**. The entire list should be deleted.
- Enter the class mid-points in L_1 pressing **Enter** after each value is entered. Then enter the corresponding frequency in L_2 pressing **Enter** after each value is entered. If you make an error, highlight the one that needs correction by using the up and down arrows. Then retype it or delete the error and retype it.
- Press **Stat**
- Use the right arrow key to highlight **Calc**
- Select **1: 1-Var Stats** by pressing **Enter**
- Then type L_1, L_2. Be sure to include the comma. Then press **Enter** for the results.

Creating a Histogram
- Press **Stat**
- Select **Edit** by pressing **Enter**
- To clear the list L_1 use the up arrow to move up and highlight L_1.
  Press **Clear** and then **Enter**. The entire list should be deleted.
- Enter the class mid-points in L_1 pressing **Enter** after each value is entered. Then enter the corresponding frequency in L_2 pressing **Enter** after each value is entered. If you make an error, highlight the one that needs correction by using the up and down arrows. Then retype it or delete the error and retype it.
- Press **2ⁿᵈ** and then **Y=**
- Select **Plot 1** by pressing **Enter**
- Highlight **ON** and press **Enter**. (This will turn on plot 1.)
- Under **Type** use the right arrow to select the histogram by highlighting it and pressing **Enter**. (Histogram is the icon that looks like a bar graph. The icon is in the first row third column.)
- The x-list should be the list where the data is located (L_1), and frequency should be the list where the frequency is located (L_2). If you only have data to put into a histogram in L_1, frequency should be 1.
- Press **Zoom**
- Select **9: Zoom Stat**

- Your histogram should appear. If you are seeing some extra lines, press **Y=** and make sure all of the equations have been deleted. Then try **Zoom Stat** again. If you wish to adjust your classes to a certain class width go to **Window**. Set your **XSCL** to the desired class width, and adjust the maximums and minimums if desired. Then **Graph.**

Box Plot (Box and Whisker Plot)
- Press **Stat**
- Select **Edit** by pressing **Enter**
- To clear the list L_1 use the up arrow to move up and highlight L_1.
  Press **Clear** and then **Enter**. The entire list should be deleted.
- Enter the values in L_1 pressing **Enter** after each value is entered. If you make an error, highlight the one that needs correction by using the up and down arrows. Then retype it or delete the error and retype it.
- Press **2nd** and then **Y=**
- Select **Plot 1** by pressing **Enter**
- Highlight **ON** and press **Enter**. (This will turn on plot 1.)
- Under **Type** use the right arrow to select the box plot by highlighting it and pressing **Enter**. (Box plot is the icon in the second row second column.)
- The x-list should be the list where the data is located and frequency should be 1.
- Press **Zoom**
- Select **9: Zoom Stat**
- Your box plot should appear. Press **Trace** and then use the left and right arrow buttons to see the values of the minimum, Q1, Q2, Q3, and the maximum.

Method 1 Find Linear Correlation Coefficient (r) & Linear Regression Equation (y = a + bx)
- Press **Stat**
- Select **Edit** by pressing **Enter**
- To clear the list L_1 use the up arrow to move up and highlight L_1. Press **Clear** and then **Enter**. The entire list should be deleted. Repeat with L_2 if necessary.
- Enter the x-values in L_1 pressing **Enter** after each value is entered. If you make an error, highlight the one that needs correction by using the up and down arrows. Then retype it or delete the error and retype it.
- Enter the y-values in L_2 in the same manner.
- Press **Stat**
- Use the right arrow key to highlight **Tests**
- Select **E: LinRegTTest…** by scrolling down using the down arrow, then press **Enter.**
- The x-list should be the list where the x values are stored (L_1) and the y-list should be where the y values are stored (L_2). Freq should be 1.
- Then highlight **Calculate** by using the down arrow and press **Enter.**

- Several values will be displayed. Use the down arrow to display the values for "a," "b," and "r." The values for "a" and "b" in the Linear Regressing equation represent the y-intercept and slope, respectively. The value of "r" is the Linear Correlation Coefficient.

Method 2 Find Linear Correlation Coefficient (r) & Linear Regression Equation (y = a + bx)
- Press **Stat**
- Select **Edit** by pressing **Enter**
- To clear the list L_1 use the up arrow to move up and highlight L_1**.** Press **Clear** and then **Enter**. The entire list should be deleted. Repeat with L_2 if necessary.
- Enter the x-values in L_1 pressing **Enter** after each value is entered. If you make an error, highlight the one that needs correction by using the up and down arrows. Then retype it or delete the error and retype it.
- Enter the y-values in L_2 in the same manner.
- Press **Stat**
- Use the right arrow key to highlight **Calc**
- Select **LinReg(a+bx)** and press **Enter**
- Enter **L_1,L_2** and press enter
- The calculator will give information for the equation of the line of least squares. If the calculator does not automatically display the values for "r" and "r^2," follow the directions below.
  - If you wish to have the calculator display "r" and "r^2" with **LinREG(ax+b)**:
    - Press **2nd** and then **0** for catalog
    - Scroll down to **DiagnosticOn**
    - Press **Enter.** This will take you back to the main calculator screen.
    - Press **Enter** again. Under "*DiagnosticOn*," the word "*Done*" will appear.
    - Press **Stat**
    - Use the right arrow key to highlight **Calc**
    - Select **LinReg(a+bx)** and press **Enter**
    - Enter **L_1,L_2** and press enter
  - If you wish to have the calculator graph the line:
    - Press **Y=**
    - Select **VARS**
    - Highlight **5: Statistics** and press **Enter**
    - Use the right arrow to highlight **EQ**
    - Select **1: RegEQ** and press **Enter**
    - Press **Graph**
    - If you cannot see the line **9:ZoomStat**.

Finding Specific and Cumulative Binomial, Poisson, and Normal Probability Distributions

If you need to find the specific probability of exactly x successes among n trials in a binomial distribution:

- Press **2ⁿᵈ** then **Vars**
- Select **0: binompdf(**
- Enter the value for n (the number of trials)
- Press comma **,**
- Enter the value for p (probability of success in any one trial)
- Press comma **,**
- Enter the value for x (number of successful trials)
- Press **Enter**

If you need to find the cumulative probabilities between x=0 and a given value of x from a binomial distribution:

- Press **2ⁿᵈ** then **Vars**
- Select **A: binomcdf(**
- Enter the value for n (the number of trials)
- Press comma **,**
- Enter the value for p (probability of success in any one trial)
- Press comma **,**
- Enter the value for x (if no value of x is entered, a list is created of all n trials 0 to n)
- Press **Enter**

If you need to find the specific probability of exactly x successes among n trials in a Poisson distribution:

- Press **2ⁿᵈ** then **Vars**
- Select **B: poissonpdf(**
- Enter the value for μ, which is the value of the mean
- Press comma **,**
- Enter the value for x, which is the number of occurrences
- Press **Enter**

If you need to find the cumulative probabilities from a Poisson distribution:

- Press **2ⁿᵈ** then **Vars**
- Select **C: poissoncdf(**
- Enter the value for μ, which is the value of the mean
- Press comma **,**
- Enter the value for x, which is the number of occurrences
- Press **Enter**

If you need to find the specific probability of exactly x successes among n trials in a normal distribution:

- Press **2ⁿᵈ** then **Vars**
- Select **1: normalpdf(**
- Enter the value of the left z-score (lower bound). If there is no lower bound, enter -10 for the z-score.
- Press comma **,**
- Enter the value of the right z-score (upper bound). If there is no upper bound, enter 10 for the z-score.
- Press **Enter**

If you need to find the cumulative probabilities from a normal distribution:

- Press **2ⁿᵈ** then **Vars**
- Select **2: normalcdf(**
- Enter the value of the left z-score (lower bound). If there is no lower bound, enter -10 for the z-score.
- Press comma **,**
- Enter the value of the right z-score (upper bound). If there is no upper bound, enter 10 for the z-score.
- Press **Enter**

Finding z-score of a Normal Distribution from Cumulative Area

Must be left-tailed area or area to the left of the z-score

- Press **2ⁿᵈ**
- Press **Vars**
- Select **3: invNorm(**
- Enter the area and press **Enter**

Confidence Intervals

If you are using given statistics:

- Press **Stat**
- Use the right arrow button to highlight **TESTS**
- Choose the appropriate test:
  - **7: ZInterval** for estimating means with large sample (n > 30)
  - **8: TInterval** for estimating means with small sample (n ≤ 30)
  - **A: 1-PropZInt** for estimating proportions
- Use the right arrow key to highlight **Stats** then press **Enter**
- Enter the requested values and then enter the decimal value for the confidence level.
- Highlight **Calculate** and press **Enter**

If you are using a data list:
- Press **Stat**
- Select **Edit** by pressing **Enter**
- To clear the list L_1 use the up arrow to move up and highlight L_1.
- Press **Clear** and then **Enter**. The entire list should be deleted.
- Enter the data values, one at a time, pressing **Enter** after each value is entered. If you make an error, highlight the one that needs correction by using the up and down arrows.
- Press **Stat**
- Use the right arrow key to highlight **Calc**
- Select **1: 1-VarStats** by pressing **Enter**
- If you want the calculations done on the values stored in L_1, press **Enter.** If you want the calculations done for another list you must type the list name and then press **Enter.**
- Record the mean and the standard deviation
- Press **Stat**
- Use the right arrow key to highlight **Tests**
- Choose appropriate test. (See above)
- After selecting the appropriate test, highlight **Data**
- Record S_x for σ. Enter the decimal value for the confidence level.
- Highlight **Calculate** and press **Enter**

Testing a claim about a mean (Large Samples n > 30)
- Press **Stat**
- Use the right arrow to highlight **Tests**
- Select **Z-Tests**
    - If given statistics:
        - Highlight **Stats** and press **Enter**
        - μ0: Enter the value from your null hypothesis
        - σ: You may use *s* if n>30
        - x̄: enter the mean from your sample
        - n: enter your sample size
        - Highlight the statement that appears in the alternative hypothesis
        - Highlight **Calculate** and press **Enter**
    - If given data:
        - Highlight **Data** and press **Enter**
        - μ0: Enter the value from your null hypothesis
        - σ: You may use *s* if n>30
        - List: enter the list with the values (ex: L_1)
        - Freq: 1
        - Highlight the statement that appears in the alternative hypothesis

- Highlight **Calculate** and press **Enter**

Testing a claim about a mean (Smaller Samples n < 30)
- Press **Stat**
- Use the right arrow to highlight **Tests**
- Select **T-Tests**
    - If given statistics:
        - Highlight **Stats** and press **Enter**
        - $\mu 0$: Enter the value from your null hypothesis
        - $\bar{x}$: enter the mean from your sample
        - Sx: enter the sample standard deviation
        - n: enter your sample size
        - Highlight the statement that appears in the alternative hypothesis
        - Highlight **Calculate** and press **Enter**
    - If given data:
        - Highlight **Data** and press **Enter**
        - $\mu 0$: Enter the value from your null hypothesis
        - List: enter the list with the values (ex: L_1)
        - Freq: 1
        - Highlight the statement that appears in the alternative hypothesis
        - Highlight **Calculate** and press **Enter**

Testing a claim about a proportion
- Press **Stat**
- Use the right arrow to highlight **Tests**
- Select **5: 1-PropZTest** and press **Enter**
    - p0: enter the value from your null hypothesis
    - x: number of successes in your sample
    - n: sample size
    - Highlight the statement that appears in the alternative hypothesis
    - Highlight **Calculate** and press **Enter**

Testing a claim about 2 means: Independent samples (σ_1 and σ_2 unknown or assumed equal)
- Press **Stat**
- Use the right arrow to highlight **Tests**
- Select **2-SampTTests**
    - If given statistics:
        - Highlight **Stats** and press **Enter**
        - $\bar{x}1$: enter the sample mean for your 1st sample
        - Sx1: enter the sample standard deviation for the 1st sample
        - n1: enter the sample size for your 1st sample
        - $\bar{x}2$: enter the mean from your 2nd sample

- Sx2: enter the sample standard deviation for the 2nd sample
- n2: enter the sample size for your 2nd sample
- Highlight the statement that appears in the alternative hypothesis
- Pooled: Highlight **Yes** if σ_1 and σ_2 are assumed to be equal, otherwise highlight **No**
- Highlight **Calculate** and press **Enter**
  - If given data:
    - Highlight **Data** and press **Enter**
    - List1: enter the list with the values for the 1st sample (ex:L_1)
    - List2: enter the list with the values for the 2nd sample (ex: L_2)
    - Freq1: 1
    - Freq2: 1
    - Highlight the statement that appears in the alternative hypothesis
    - Pooled: Highlight **Yes** if σ_1 and σ_2 are assumed to be equal, otherwise highlight **No**
    - Highlight **Calculate** and press **Enter**

Testing a claim about 2 means: Independent samples (σ_1 and σ_2 known)
- Press **Stat**
- Use the right arrow to highlight **Tests**
- Select **2-SampZTests**
  - If given statistics:
    - Highlight **Stats** and press **Enter**
    - σ_1: enter the population standard deviation for the 1st sample
    - σ_2: enter the population standard deviation for the 2nd sample
    - $\bar{x}_1$: enter the sample mean for your 1st sample
    - n1: enter the sample size for your 1st sample
    - $\bar{x}_2$: enter the mean from your 2nd sample
    - n2: enter the sample size for your 2nd sample
    - Highlight the statement that appears in the alternative hypothesis
    - Highlight **Calculate** and press **Enter**
  - If given data:
    - Highlight **Data** and press **Enter**
    - σ_1: enter the population standard deviation for the 1st sample
    - σ_2: enter the population standard deviation for the 2nd sample
    - List1: enter the list with the values for the 1st sample (ex:L_1)
    - List2: enter the list with the values for the 2nd sample (ex: L_2)
    - Freq1: 1
    - Freq2: 1
    - Highlight the statement that appears in the alternative hypothesis
    - Highlight **Calculate** and press **Enter**

Testing a claim about 2 proportions
- Press **Stat**
- Use the right arrow to highlight **Tests**
- Select **2-PropZTests**
    - x1: enter the number of successes in your 1st sample
    - n1: enter the sample size for your 1st sample
    - x2: enter the number of successes in your 2nd sample
    - n2: enter the sample size for your 2nd sample
    - Highlight the statement that appears in the alternative hypothesis
    - Highlight **Calculate** and press **Enter**

Testing a claim about dependent samples
- Press **Stat**
- Select **Edit** by pressing **Enter**
- To clear the list L_1 use the up arrow to move up and highlight L_1
- Press **Clear** and then **Enter**. The entire list should be deleted.
- Repeat steps to clear L_2
- Enter the 1st part of the paired sample data values into L_1 one at a time, pressing **Enter** after each value is entered. If you make an error, highlight the one that needs correcting by using the up and down arrows.
- Enter the 2nd part of the paired sample data values into L_2 in the same manner.
- Press **2nd** then **Mode** to return to the main screen.
- Press **2nd** then **1** for L_1
- Press **–**
- Press **2nd** then **2** for L_2
- Press **Sto→**
- Press **2nd** then **3** for L_3
- Press **Enter**. This will store the differences of the paired data points in L_3.
- Press **Stat**
- Use the right arrow to highlight **Tests**
- Select **T-Tests**
- Highlight **Data** and press **Enter**
- μ_0: Enter the value from your null hypothesis
- List: enter L_3
- Freq: 1
- Highlight the statement that appears in the alternative hypothesis
- Highlight **Calculate** and press **Enter**