Confidence Intervals on the TI-83/84

Written by Jeff O'Connell – joconnell@ohlone.edu
Ohlone College
http://www2.ohlone.edu/people2/joconnell/ti/ - A video tutorial can be found at this site

Stat vs. Data – Throughout this section the calculator will ask you if you have [Data] or [Stats]. *Stats* is when you just have the statistics about the data such as the mean and standard deviation. *Data* is when you have the actual data. In the case where you have Data, you will enter the data into a list and tell the calculator which list the data is in. Both types of examples are shown in this section.

All Confidence intervals and Hypothesis testing can be found by pressing STAT and scrolling to [TESTS].

Confidence intervals for the population mean

Example 1: A sample of 38 items is chosen from a normally distributed population with a sample mean of 12.5 and a population standard deviation of 2.8. Construct a 95% confidence interval for the true population mean.

Solution: We choose [7:Z-interval] since we are using a z-distribution. Enter the information as shown in screen 1 below, highlight [Calculate] and press ENTER to get screen 2.

NOTE: This is the form of the intervals that the calculator gives. *(11.61, 13.39)* is equivalent to $11.61 < \mu < 13.39$.

Screen 1   *Screen 2*

Example 2: A sample of 7 items is chosen from a normal distribution with the following results: {1, 5, 6, 8, 12, 16, 18}. Construct a 95% confidence interval for the true population mean.

Solution: Here we are given the actual data from the sample. We can have the calculator do all of the work on the sample by entering the data into a list, say L1 as shown in screen 3. Choose [8:TInterval...] and enter the information as shown in screen 4, highlight [Calculate] press ENTER to get the results shown in screen 5.

Screen 3   *Screen 4*   *Screen 5*

NOTE: Freq stands for Frequency which may be used if you have data where a lot of the data points are repeated. For example, if your data consists of 1, 1, 1, 2, 2, 3, 4 you can enter all of the distinct the data points in L1 and the frequencies in L2. So L1 = {1, 2, 3, 4} and L2 = {3, 2, 1, 1}. We can enter L1 as the *List* and L2 as the *Freq*. It will most often be the case that we will use 1 as the Freq but this option is available.

Confidence Intervals for the Population Proportion p

Example 3: For x = 14, n = 35 construct a 95% confidence interval for p, the true population proportion.

Solution: Select [A:1–PropZInt...] and enter the information shown in screen 6, highlight [Calculate] press ENTER to get the results shown in screen 7.

Screen 6   *Screen 7*

Note: The value of x must be an integer.

Confidence Intervals for the difference in two population means.

Example 4: Find a 95% confidence interval for the difference in means for two normally distributed populations from the sample information given.

$\bar{x}_1 = 78.5$ $\qquad$ $\bar{x}_2 = 75.3$

$\sigma_1 = 12.8$ $\qquad$ $\sigma_2 = 11.4$

$n_1 = 40$ $\qquad$ $n_2 = 50$

Solution: Select [9:2–SampZInt...] and enter the information shown in screen 8, highlight [Calculate] press ENTER to get the results shown in screen 9.

```
2-SampZInt
 Inpt:Data Stats
 σ1:12.8
 σ2:11.4
 x̄1:78.5
 n1:40
 x̄2:75.3
↓n2:50
 C-Level:.95
 Calculate
```
Screen 8

```
2-SampZInt
 (-1.871,8.2714)
 x̄1=78.5
 x̄2=75.3
 n1=40
 n2=50
 ∎
```
Screen 9

Example 5: Use the following data taken from two normally distributed populations to find a 95% confidence interval for the difference in population means. For the sample information shown in the screen to the right with L1 being sample from population 1 and L2 from population 2.

```
L1      L2      L3      2
1       2       ------
3       4
5       6
7       8
9
        ------  ------
L2(1)=2
```

Solution: After entering the sample data into L1 and L2 as shown, we must determine if the variances are significantly different, that is, test the claim $H_0: \sigma_1^2 = \sigma_2^2$ against $H_1: \sigma_1^2 \neq \sigma_2^2$. Select [D:2–SampFTest...] and enter the information shown in screen 10, highlight [Calculate] press ENTER to get the results shown in screen 11.

```
2-SampFTest
 Inpt:Data Stats
 List1:L1
 List2:L2
 Freq1:1
 Freq2:1
 σ1:≠σ2 <σ2 >σ2
 Calculate Draw
```
Screen 10

```
2-SampFTest
 σ1≠σ2
 F=1.5
 p=.7698003589
 Sx1=3.16227766
 Sx2=2.5819889
↓x̄1=5
 ∎
```
Screen 11

The large p-value (bigger than $\alpha = 0.05$) indicated that we must "pool" the variances. If the p-value were smaller that 0.05 we would not pool the variances. Select [0:2–SampTInt...] and enter the information shown in screen 12, highlight [Calculate] press ENTER to get the results shown in screen 13.

```
2-SampTInt
 Inpt:Data Stats
 List1:L1
 List2:L2
 Freq1:1
 Freq2:1
 C-Level:.95
↓Pooled:No Yes
 Calculate
```
Screen 12

```
2-SampTInt
 (-4.644,4.644)
 df=7
 x̄1=5
 x̄2=5
 Sx1=3.16227766
↓Sx2=2.5819889
 SxP=2.92770022
 n1=5
 n2=4
```
Screen 13

Difference in two population proportions

Example 6: Find a 90% confidence interval for the difference in population proportions where $x_1 = 14$, $n_1 = 40$, $x_2 = 17$, and $n_2 = 50$.

Solution: Select [B:2–PropZInt...] and enter the information shown in screen 14, highlight [Calculate] press ENTER to get the results shown in screen 15.

```
2-PropZInt
 x1:14
 n1:40
 x2:17
 n2:50
 C-Level:.9
 Calculate
```
Screen 14

```
2-PropZInt
 (-.1559,.17592)
 p̂1=.35
 p̂2=.34
 n1=40
 n2=50
 ∎
```
Screen 15