

# TI-83/83 Plus: Confidence Interval for Two-Sample Proportion

The following pages contain some instructions on the usage of the TI-83/83 Plus graphing calculator.

The examples used below are taken out of David Moore's text titled "The Basic Practice of Statistics, 2<sup>nd</sup> Edition".

Example#8.9 and 8.10 on pages 447 and 449: To study the long-term effects of preschool programs for poor children, the High/Scope Educational Research Foundation has followed two groups of Michigan children since early childhood. One group of 62 attended preschool as 3 and 4-year-olds. This is a sample from Population 2, poor children who attended preschool. A control group of 61 children from the same area and similar backgrounds represents Population 1, poor children with no preschool. Thus the sample sizes are  $n_1=61$  and  $n_2=62$ .

One response variable of interest is the need for social services as adults. In the past ten years, 38 of the preschool sample and 49 of the control group sample have needed social services (mainly welfare). The sample proportions are given below.

$$\hat{p}_1 = \frac{49}{61} = 0.803$$

$$\hat{p}_2 = \frac{38}{62} = 0.613$$

That is, about 80% of the control group use social services, as opposed to about 61% of the preschool group.

The difference  $p_1-p_2$  measures the effect of preschool in reducing the proportion of people who later need social services. To estimate how large the reduction is, we give a 95% confidence interval for the difference,  $p_1-p_2$ .

Press **[STAT]**. Press **[▶]** two times to scroll right to the TESTS menu option. Press **[▼]** several times to move the cursor down to **B:2-PropZInt**, which stands for two-sample z confidence interval for proportions. At this point, your screen should look like the screen on the left given below.

```
EDIT CALC TESTS
6:2-PropZTest...
7:ZInterval...
8:TInterval...
9:2-SampZInt...
0:2-SampTInt...
A:1-PropZInt...
B:2-PropZInt...
```

```
2-PropZInt
x1:45
n1:133
x2:123
n2:162
C-Level: .99
Calculate
```

```
2-PropZInt
x1:49
n1:61
x2:38
n2:62
C-Level: .95
Calculate
```

Press **[ENTER]** to select **B:2-PropZInt** and go into the STAT TESTS menu screen. At this point, your screen should look like the screen in the middle given above with the cursor blinking by **x1**. You may possibly have different numbers. Type in 49 for the value of **x1**. Press **[▼]** to move the cursor down to **n1**: Since the first sample size is  $n_1=61$ , type in 61 for the value of **n1**. Press **[▼]** to move the cursor down to **x2**. Type in 38 for the value of **x2**. Press **[▼]** to move the cursor down to **n2**: Since the second sample size is  $n_2=62$ , type in 62 for the value of **n2**. Press **[▼]** to move the cursor down to **C-Level**: Type in 0.95 for computing a 95% confidence interval for  $p_1-p_2$ . Press **[▼]** to move the cursor down to **Calculate** option. At this point, your screen should look like the screen on the right given above with the cursor blinking over the **Calculate** option.

Press **ENTER** to select the **Calculate** option. Your calculated result screen should look like the screen on given below.

```
2-PropZInt
(.03337, .34738)
P1=.8032786885
P2=.6129032258
n1=61
n2=62
```

In addition to the confidence interval, the calculator will have computed the sample proportion values of  $\hat{p}_1 = 0.803$  and  $\hat{p}_2 = 0.613$ , and display them along with the sample size values of  $n_1=61$  and  $n_2=62$ .

The interpretation of the above computed confidence interval in the context of the problem can be stated as follows. We are 95% confident that the proportion of people needing social services is somewhere between 0.033 and 0.347 lower among people who attended preschool. The confidence interval is wide because the samples are quite small.