

TI-83/83 Plus: Hypothesis Testing 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, 2nd Edition".

Example#8.11 and 8.12 on pages 452 and 453: High levels of cholesterol in the blood are associated with higher risk of heart attacks. Will using a drug to lower blood cholesterol reduce heart attacks? The Helsinki Heart Study looked at this question. Middle-aged men were assigned at random to one of two treatments: 2051 men took the drug gemfibrozil to reduce their cholesterol levels, and a control group of 2030 men took a placebo. During the next five years, 56 men in the gemfibrozil group and 84 men in the placebo group had heart attacks. The sample proportions that had the heart attacks are given below:

$$\hat{p}_1 = \frac{56}{2051} = 0.0273 \quad (\text{gemfibrozil group})$$

$$\hat{p}_2 = \frac{84}{2030} = 0.0414 \quad (\text{placebo group})$$

That is, about 4.1% of the men in the placebo group had heart attacks, against only about 2.7% of the men who took the drug. Is the apparent benefit of gemfibrozil statistically significant? We hope to show that gemfibrozil reduces heart attacks, which means that we have a one-sided alternative hypothesis in the form of $H_a: p_1 < p_2$.

Press **[STAT]**. Press **[▶]** two times to scroll right to the TESTS menu option. Press **[▼]** five times to move the cursor down to **6:2-PropZTest**, which stands for two-sample z test for population proportion. At this point, your screen should look like the screen on the left given below.

```

EDIT CALC TESTS
1:Z-Test...
2:T-Test...
3:2-SampZTest...
4:2-SampTTest...
5:1-PropZTest...
6:2-PropZTest...
7:ZInterval...
    
```

```

2-PropZTest
x1:49
n1:61
x2:38
n2:62
p1:#P2 <P2 >P2
Calculate Draw
    
```

```

2-PropZTest
x1:56
n1:2051
x2:84
n2:2030
p1:#P2 <P2 >P2
Calculate Draw
    
```

Press **[ENTER]** to select **6:2-PropZTest** 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 56 for the value of **x1**. Press **[▼]** to move the cursor down to **n1**: Since the first sample size is $n_1=2051$, type in 2051 for the value of **n1**. Press **[▼]** to move the cursor down to **x2**. Type in 84 for the value of **x2**. Press **[▼]** to move the cursor down to **n2**: Since the second sample size is $n_2=2030$, type in 2030 for the value of **n2**. Press **[▼]** to move the cursor down to **p1:#p2 <p2 >p2** Since we hope to show that gemfibrozil reduces heart attacks, the alternative hypothesis for this example is the one-sided alternative hypothesis of $H_a: p_1 < p_2$. Scroll over to the **<p2** option. Press **[ENTER]** to select that option. 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 the left given below. Press **▼** twice to see the rest of the items on the calculated result screen. Your screen should look like the screen in the middle given below.

```

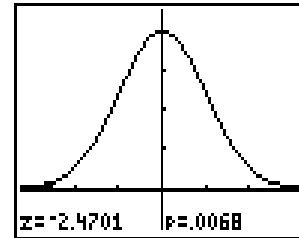
2-PropZTest
P1<P2
z=-2.470088266
P=.0067539941
p1=.0273037543
p2=.0413793103
p=.0343053173
↓

```

```

2-PropZTest
P1<P2
↑p1=.0273037543
p2=.0413793103
p=.0343053173
n1=2051
n2=2030

```



In addition to the z test statistic value of $z = -2.4701$ and the P-value of $P = 0.0068$, the calculator will have computed the sample proportion values of, $\hat{p}_1 = 0.0273$, $\hat{p}_2 = 0.0414$ and the pooled sample proportion value of $\hat{p} = 0.0343$ and display them along with the sample size values of $n_1 = 2051$ and $n_2 = 2030$.

Since the P-value of $P = 0.00680 < 0.01$, the results are statistically significant at the $\alpha = 0.01$ level. There is strong evidence that gemfibrozil reduced the rate of heart attacks. The large sample sizes in the Helsinki Study helped the study get highly significant results.

The one sided P-value is the area under the standard normal curve to the left of the z test statistic value of $z = -2.4701$. We could also draw the standard normal distribution curve with the observed value of z and the computed P-value indicated by the shaded region of the curve. To accomplish this task, press **STAT**. Press **▶** two times to scroll right to the TESTS menu option. Press **▼** five times to move the cursor down to **6:2-PropZTest** Press **ENTER** to select **6:2-PropZTest** and go into the STAT TESTS menu screen. Scroll all the way down to the **Calculate Draw** option. Press **▶** to move the cursor over the **Draw** option. Press **ENTER** to select this option. Your screen should look like the screen on the right given above.