

Using the TI-83/84 Plus

Chapter 8: Hypothesis Testing - One Sample

Here we see how to use the TI 83/84 to conduct hypothesis tests about proportions and means. The software will calculate the test statistic and the P -value for the test statistic. It does not give you the critical value. For tests about means, you can either input raw data via a list or simply enter the sample statistics. In all cases you will need to input a value from the null hypothesis and whether the test is left, right, or two-tailed.

All of these test functions can be found by pressing the **STAT** button and highlighting **TESTS**.

Each topic has its own page or you can go directly to the videos.

- **Chapter 8.2 - Tests about a Proportion** 1-PropZTest 2



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- **Chapter 8.3 - Tests about a Mean (σ unknown)** T-Test 3



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- **Chapter 8.4 - Tests about a Mean (σ known)** Z-Test 4



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Hypothesis Tests about a Proportion: 1-PropZTest


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1. Press the **STAT** button and highlight TESTS.
2. Scroll down to 5:1-PropZTest ...
3. You have to enter the proportion from the null hypothesis (p_0), the number of successes in the sample (x), the number of trials (or sample size) (n), then select two-tailed ($\text{prop} \neq p_0$), left-tailed ($\text{prop} < p_0$) or right-tailed ($\text{prop} > p_0$).
4. Highlight Calculate and hit **ENTER**
5. It gives you the test statistic (z) and the P -value for the test statistic (p) based on your choice of two-tailed, left-tailed, or right-tailed test.

Warning: The P -value may be given in scientific notation.

For example $2.143 \text{ E}^{-6} = 2.143 \times 10^{-6} = 0.000002143$.

Example: A coin used by the NFL to decide which team gets first pick at the beginning of a game is tested to see if it is fair. In 100 tosses there were 43 heads and 57 tails. The officials claim that this coin is a fair coin. Test their claim at the 0.05 significance level.

Let p represent the proportion of heads in **all** tosses of the coin.

Claim: $p = 0.50$

$H_0: p = 0.50$

$H_1: p \neq 0.50$

Getting There: **STAT**

```

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

Input

```

1-PropZTest
p0:.5
x:43
n:100
PROP≠p0 <p0 >p0
Calculate Draw
  
```

Output

```

1-PropZTest
PROP≠.5
z=-1.4
P=.1615134223
x̄=.43
n=100
  
```

Conclusion: Since the P -value (0.1615) is greater than α (0.05) we fail to reject the null hypothesis. There is not enough data to reject the claim that the coin is fair.

Hypothesis Tests about a Mean (σ unknown): T-Test


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1. Press the **STAT** button and highlight TESTS.
2. Scroll down to 2:T-Test...
3. Highlight Data or Stats
 - **Data**: If you choose Data the calculator does all the work but you have to enter the mean from the null hypothesis (μ_0) and select two-tailed ($\mu \neq \mu_0$), left-tailed ($\mu < \mu_0$) or right-tailed ($\mu > \mu_0$). If your data is a standard list, set **Freq:** to 1. If your data is entered as a frequency distribution, put in the list which contains the frequencies.
 - **Stats**: If you choose, Stats, you have to enter the mean from the null hypothesis (μ_0), the sample mean \bar{x} , the sample standard deviation (s_x), the sample size (n), and select two-tailed ($\mu \neq \mu_0$), left-tailed ($\mu < \mu_0$) or right-tailed ($\mu > \mu_0$).
4. Highlight Calculate and hit **ENTER**
5. It gives you the test statistic (t) and the P -value for the test statistic (p) based on your choice of two-tailed, left-tailed, or right-tailed test (so make sure you entered that correctly).

Warning: The P -value may be given in scientific notation.

For example $2.143 \text{ E}^{-6} = 2.143 \times 10^{-6} = 0.000002143$.

Example: Carl the farmer has started using organic fertilizer this year. The average weight of his tomatoes last year was 10.3 ounces. A sample of 40 tomatoes from this years crop reveals a mean weight of 9.8 ounces with a standard deviation of 1.7 ounces. Assume the weights are normally distributed. Use a 0.05 significance level to test the claim that the mean weight of his tomatoes this year is different from the mean last year.

Let μ represent the mean weight of this year's tomatoes.

Claim: $\mu \neq 10.3$

$H_0: \mu = 10.3$

$H_1: \mu \neq 10.3$

Getting There: **STAT**

```

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

Input

```

T-Test
Inpt:Data  Stats
μ₀:10.3
x̄:9.8
Sx:1.7
n:40
μ:≠μ₀ <μ₀ >μ₀
Calculate Draw
  
```

Output

```

T-Test
μ≠10.3
t=-1.86016333
p=.0704159949
x̄=9.8
Sx=1.7
n=40
  
```

Conclusion: Since the P -value (≈ 0.0704) is greater than α (0.05) we fail to reject the null hypothesis. There is not enough data to support the claim that the mean weight of his tomatoes this year is different from the mean last year. **Note:** When you do a left-tailed test the P -value is about 0.0352 which is less than α and you can reject the null hypothesis.

Hypothesis Tests about a Mean (σ known): Z-Test


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1. Press the **STAT** button and highlight TESTS.
2. Scroll down to 1:Z-Test...
3. Highlight Data or Stats
 - **Data**: If you choose Data the calculator does all the work but you have to enter the mean from the null hypothesis (μ_0), the population standard deviation (σ), and select two-tailed ($\mu \neq \mu_0$), left-tailed ($\mu < \mu_0$) or right-tailed ($\mu > \mu_0$). If your data is a standard list, set Freq: to 1. If your data is entered as a frequency distribution, put in the list which contains the frequencies.
 - **Stats**: If you choose, Stats, you have to enter the mean from the null hypothesis (μ_0), the population standard deviation (σ), the sample mean \bar{x} , the sample size (n), and select two-tailed ($\mu \neq \mu_0$), left-tailed ($\mu < \mu_0$) or right-tailed ($\mu > \mu_0$).
4. Highlight Calculate and hit **ENTER**
5. It gives you the test statistic (z) and the P -value for the test statistic (p) based on your choice of two-tailed, left-tailed, or right-tailed test (so make sure you entered that correctly).

Warning: The P -value may be given in scientific notation.

For example $2.143 \text{ E}^{-6} = 2.143 \times 10^{-6} = 0.000002143$.

Example: It has been reported that the mean head circumference of adult males is 55.90 cm with a standard deviation of 1.7 cm. In a study involving 63 randomly selected male college students, the mean head circumference was 55.12 cm. At the 0.05 significance level, test the claim that male college students have smaller heads than the average adult male. Assume head circumferences are normally distributed and the population standard deviation for male college students is the same as for adult males in general.

Let μ represent the mean head circumference of all male college students.

Claim: $\mu < 55.90$

H_0 : $\mu = 55.90$

H_1 : $\mu < 55.90$

Getting There: **STAT**

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

Input

```
Z-Test
Inpt:Data  Stats
μ₀:55.9
σ:1.7
x̄:55.12
n:63
μ:≠μ₀  <μ₀  >μ₀
Calculate Draw
```

Output

```
Z-Test
μ<55.9
z=-3.641798863
P=1.3540403E-4
x̄=55.12
n=63
```

Conclusion: Since the P -value ($1.3540403 \times 10^{-4} \approx .0001354$) is smaller than α (0.05) we reject the null hypothesis. The sample data supports the claim that male college students have a mean head circumference below the mean for adult males.

Entering Data into Lists:



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1. Press the **STAT** button.
2. Highlight the EDIT option (using the arrows) and hit **ENTER**.
3. Choose a list (from L_1, L_2, \dots, L_6) using the arrows and enter the values by column.
Hit **Enter** or the down-arrow to move down the column.
4. You can **clear** a list by highlighting the list name and hitting the **Clear** button.