

## Lab Activity: Hypothesis Testing – Single Variance

In this lab activity, you will conduct a hypothesis test for claims involving a single variance or standard deviation.

### Student Learning Outcomes

By the end of this chapter, you should be able to do the following:

- Perform a hypothesis test of a single variance using Statcato

### Preliminary

**Read** Chapter 11 The Chi-Square Distribution in:

Illofsky, Barbara, and Susan Dean. Collaborative Statistics. Connexions. 2 Mar. 2010  
<<http://cnx.org/content/col110522/1.37/>>.

### Guided Problems

1. Suppose a study involving 500 adult females in your community found that the variance of their heights is 9.0 inches. Using a 0.05 significance level, test the claim that the population variance of adult females in your community is 7.84 inches.

### Formulating the Hypothesis Test

Answer the following questions in **LR: Problem 1 – Hypotheses**.

- State the claim that you are testing.
- State the null and alternative hypotheses.
  - $H_0$ :
  - $H_a$ :
- Is this a right-tailed, left-tailed, or two-tailed test?

### Performing the Hypothesis Test

Using Statcato, you will perform calculations for the hypothesis test.



### Performing a Hypothesis Test for a Single Variance (Summary Data)

Go to [Statistics](#) > [Hypothesis Tests](#) > [1-Population Variance](#).

- In the **Inputs** panel, select **Summarized sample data** radio button. Enter the sample size (500) in the provided text box. Select **Variance** and enter the sample variance (9).
- For **Significance Level**, enter **0.05**.
- In the **Alternative Hypothesis** panel, select the form of the alternative hypothesis (<, ≠, or >). Select **Hypothesized variance**, and enter the **hypothesized variance** (7.84).
- Click **OK**.

Copy the computation results to **LR: Problem 1 – Hypothesis Test**.

### Making Conclusions

Based on the computer-generated results, draw conclusions for the hypothesis test. Record your answers in **LR: Problem 1 – Conclusion**.

- Based on the significance level  $\alpha$  and the computed p-value, decide whether to reject  $H_0$  and explain why.
  - Based on your decision on the null hypothesis, make a conclusion about your claim.
2. Assume that the standard deviation of U.S. male heights is 2.8 inches. Given the heights of the L.A. Lakers players, test the claim that the heights of L.A. Lakers players vary more than those of the population of U.S. males. Use a 0.05 significance level.

Player	Height (inches)
Ariza, Trevor	80
Bryant, Kobe	78
Bynum, Andrew	84
Crawford, Joe	77
Farmar, Jordan	74
Fisher, Derek	73
Gasol, Pau	84
Giles, C.J.	83
Heath, Brandon	76
Mbenga, DJ	84
Mihm, Chris	84
Mitchell, Dwayne	77
Odom, Lamar	82
Powell, Josh	81
Radmanovic, Vladimir	82
Vujacic, Sasha	79
Walton, Luke	80
Yue, Sun	79

Source: <http://sportsillustrated.cnn.com/basketball/nba/rosters/lakers.html> (Retrieved 6/9/10)

### Formulating the Hypothesis Test

Answer the following questions in **LR: Problem 2 – Hypotheses**.

- State the claim that you are testing.
- State the null and alternative hypotheses.

- $H_0$ :
- $H_a$ :
- Is this a right-tailed, left-tailed, or two-tailed test?

## Performing the Hypothesis Test



### Performing a Hypothesis Test for a Single Variance (Sample Values)

Enter the 18 heights in column **C1**.

Go to **Statistics > Hypothesis Tests > 1-Population Variance**.

- In the **Inputs** panel, select **Samples in column** radio button. Choose **C1** in the drop-down menu.
- For **Significance Level**, enter **0.05**.
- In the **Alternative Hypothesis** panel, select the form of the alternative hypothesis ( $<$ ,  $\neq$ , or  $>$ ). Select **Hypothesized standard deviation**, and enter the **hypothesized standard deviation** (2.8).
- Click **OK**.

Copy the computation results to **LR: Problem 2 – Hypothesis Test**.

## Making Conclusions

Based on the computer-generated results, draw conclusions for the hypothesis test. Record your answers in **LR: Problem 2 – Conclusion**.

- Based on the significance level  $\alpha$  and the computed p-value, decide whether to reject  $H_0$  and explain why.
- Based on your decision on the null hypothesis, make a conclusion about your claim.

## Problems

Repeat the procedures described above for the following two problems (record answers in **LR: Problem 3** and **LR: Problem 4**):

3. Assume that IQ scores of adults are normally distributed with a mean of 100 and standard deviation of 15. A sample of 100 IQ scores of students at XYZ College yields a standard deviation of 16. Use a 0.01 significance level to test the claim that the standard deviation of IQ scores of students at XYZ College is greater than 15.
4. The weights of a sample of 50 female ballet dancers have a standard deviation of 15 lbs. Assume that the standard deviation of weights of the population of females is 20 lbs. Test the claim that weights of ballet dancers vary less than the weights of women in general. Use a 0.01 significance level.