Lab Activity: Hypothesis Testing – Single Population Proportion

In this lab activity, you will conduct hypothesis testing for claims involving a single population proportion.

Student Learning Outcomes

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

- Perform hypothesis testing for a single population proportion using Statcato
- Interpret the results of hypothesis tests

Preliminary

Read Chapter 9 Hypothesis Testing: Single Mean and Single Proportion in:

Illowsky, Barbara, and Susan Dean. Collaborative Statistics. Connexions. 2 Mar. 2010 <http://cnx.org/content/col10522/1.37/>.

Make sure you understand the following **key terms** (**LR:Key Terms**):

hypothesis testing, hypothesis, null hypothesis, alternative hypothesis, Type I error, Type II error, rare event rule, p-value

Background

According to the Humane Society of the United States, 39% of U.S. households own at least one dog. You want to determine if the percentage of students at your school who have dogs at home is the different from the national percentage. You will conduct a hypothesis test for the proportion of dog ownership with the help of Statcato.

Sampling Data

Survey 30 students at your schools using a random sampling method of your choice. Ask each subject whether his or her household owns at least one dog. Discuss the details and results of the data collection process in **LR: Data**.

Formulating the Hypothesis Test

Answer the following questions in **LR: 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?
- Define the random variable for this test.

Performing the Hypothesis Test

Using Statcato, you will perform calculations for the hypothesis test using a significance level of 0.05 ($\alpha = 0.05$).

Performing Hypothesis Test: 1-Population Proportion

Go to `Statistics > Hypothesis Tests > 1-Population Proportion`.

- For **Inputs,** select **Summarized sample data**. Enter the number of events (x) and the number of trials (n) in the given text boxes.
- For **Significance Level**, enter **0.05**.
- For **Alternative Hypothesis**, choose **Not Equal to** in the drop-down menu. Enter **0.39** in the **Hypothesized Proportion** text box.
- Click **OK**.

Copy the computation results to **LR: Hypothesis Test**.

Making Conclusions

Based on the computer-generated results, you will make decisions and draw conclusions for the hypothesis tests. Record your answers in **LR: Interpretation**.

Decisions on Null Hypothesis

Recall that

- If $\alpha \leq$ p-value, do not reject H_0.
- If $\alpha >$ p-value, reject H_0.

Based on the significance level α and the computed p-values, decide whether to reject H_0 and explain why.

Conclusions

Based on your decisions on the null hypothesis, make a conclusion about your claim. For example, your conclusion could be worded as follows:

> At the 5% level of significance, the sample data (shows / does not show) sufficient evidence to support the claim that _____.

Discussion

Answer the following questions in **LR: Discussion**.

1. What type of probability distribution is used in this study of population proportion? Why is it being used?
2. State the Type I and Type II errors for this study.
3. How would you change the hypothesis test if you want to reduce the probability of committing the Type I error?