

Lab Activity: Confidence Intervals – Single Population Proportion

In this lab activity, you will explore confidence intervals to estimate a single population proportion.

Student Learning Outcomes

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

- Compute confidence intervals for a single population proportion in Statcato
- Interpret and examine the properties of confidence intervals

Preliminary

Read Chapter 8 Confidence Intervals in:

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

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

point estimate, confidence interval, margin of error, error bound for a population proportion, confidence level, alpha

Collecting Data

Suppose you are conducting a study involving the proportion of students who drive to school. Survey 50 students on campus and ask if they drive to school. Calculate the proportion of students who drives to school. Record the results (LR: Data).

(*n) Sample size $n =$ _____

(*x) Number of students who drive to school $x =$ _____

(*p') Sample proportion $p' =$ _____

Constructing Confidence Intervals for Various Confidence Levels

You will construct the confidence interval of the proportion of students who drive to school for different confidence levels.



Generating CIs estimating a population proportion

Repeat the following steps for each of these confidence levels: 50%, 80%, 90%, 95%, 99%

Go to [Statistics > Confidence Intervals > 1-Population Proportion](#) (or click the corresponding item in the Dialog History)

- Select **Summarized sample data**:
 - Number of events: enter x (from *x)
 - Number of trials: enter n (from *n)

- **Confidence level:** enter the appropriate confidence level (e.g. enter 0.5 for 50%)
- Click **OK**.

The confidence intervals should now be displayed in the Log window. Copy them to **LR: Confidence Intervals Varying Confidence Level**.

Determining Sample Size for Various Confidence Levels

Suppose you want to determine the proper sample size for your study so that the error is no more than 5%. You also want to investigate the effect of a confidence level in the required sample size. You will use Statcato to help you in the sample size determination process.



Determining sample size estimating population proportion

Repeat the following steps for each of these confidence levels: 50%, 80%, 90%, 95%, 99%

Go to **Statistics > Sample Size > 1-Population Proportion** (or go to the corresponding item in Dialog History)

- **Confidence Level:** enter the appropriate confidence level (e.g. enter 0.8 for 80%)
- **Proportion Estimate:** enter the sample proportion you obtained earlier (from *p')
- **Margin of Error:** 0.05
- Click **OK**.

Record the results in **LR: Sample Size Varying Confidence Level**.

Discussion

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

1. Using the 90% confidence interval you obtained, make a statement about the estimate of the population proportion of students who drive to school.
2. What happens to the error bound of the proportion (margin of error) and the confidence intervals as the confidence level increases? Explain why.
3. What happens to the sample size needed to achieve a certain margin of error as the confidence level increases? Explain why.