

JMP INTRO® Lab Activities

Lab Activity – Confidence Interval for a Mean

Data Set: Big Class

The sample mean is sometimes called a *point estimate* because it is only a single value. The true mean of the population is rarely this value. It would be useful to have an interval, rather than a single point, that we could be relatively sure contains the true mean. If we are 95% confident that the interval contains the population mean, we have a *95% confidence interval* for the population mean.

You should have already used the formula for a confidence interval:

$$\text{C.I. for the mean: } \bar{x} \pm (t \text{ critical value}) \left(\frac{s}{\sqrt{n}} \right)$$

In this activity, you will learn how to use JMP INTRO to find a confidence interval for a mean.

Start your computer, open JMP INTRO and open the data file named **Big Class**. This is the data set containing the heights (in inches) and weights (in pounds) of 40 martial arts students. While we can work with these students as one large sample, there may be differences in the students based on their gender. It might be useful to do separate confidence intervals for the mean heights of male and female students.

Go to the data table and in the **Rows** menu use **Row Selection® Select Where...**, select **sex, equals, F**. All of the subject numbers in data rows for females should now be highlighted. To figure the mean for the male martial arts students, you want to exclude the female students from the calculation and hide them from the graph. Use the **Row** menu to **exclude** and **hide** the selected female students. Use **Analyze® Distribution** and height as the **Y,Column** to create a Histogram and tables of Quantiles (includes the 5-number summary) and Moments (includes the mean and standard deviation) for heights of the sample of 22 males in the class. If this class can be considered a random sample of all the classes of martial students of this age range, rather than a point value for the mean, you would be interested in a confidence interval. Click the red triangle next to height and select **Confidence® Interval® .95**. A new Confidence Interval table will appear in the display giving the (point) estimate, Lower CI, Upper CI and 1-Alpha.

Open your word processing program and copy the histogram with a count axis and the confidence interval for the mean (you will need to edit out the standard deviation line) into your report. Make sure you put a title on your graph.

Click the red triangle next to height and select **Confidence® Interval® .90**. Copy this new confidence interval table into your report. Click the red triangle next to height and

select **Confidence** \otimes **Interval** \otimes **.99**. Again, copy this into your report. Describe how changing the confidence level affects the width of the confidence interval. Looking at your histogram, what hesitations might you have in using a confidence interval?

Use **Rows** \otimes **Clear Row States** to deselect, unhide and unexclude the female students.

Repeat the entire process, selecting, hiding and excluding the male students to find the 90%, 95%, and 99% confidence intervals for the mean height of the sample of 18 female students.

Print a copy of your lab report. Proofread your copy, make corrections as needed, close JMP INTRO and the word processing program, and log off.

JMP INTRO® Lab Activities

Teacher Notes

Lab Activity – Confidence Interval for a Mean

Objectives:

- Use JMP INTRO to display numeric data with a histogram.
- Use JMP INTRO to calculate confidence intervals for a mean using different confidence levels.
- Select, hide and exclude data to isolate the subjects of interest.

Time Required: Approximately 20 to 30 minutes

Materials:

- Confidence Interval for a Mean student activity directions
- Big Class data set

Prerequisites:

- Students should have experience producing confidence intervals for a mean by hand and/or with graphing calculators.
- Students should have basic knowledge of how to use a word processing program.

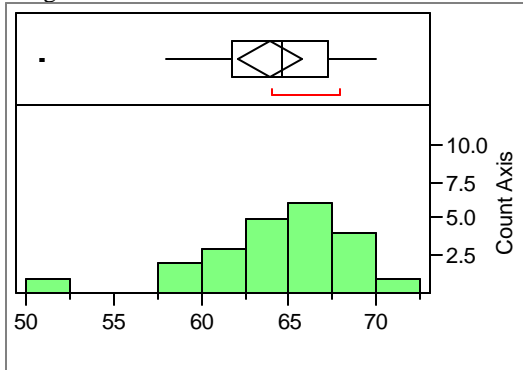
JMPINTRO Notes:

- When a row is selected, hidden and excluded, the data in that row is not included in the histogram or data analysis. This may be confusing because these rows are highlighted and students may think that the highlighted rows are the ones used.

JMP INTRO® Lab Activities Answer Key

Here are suggested answers for Lab Activity – Confidence Interval for a Mean:

Heights of 22 male martial arts students



Confidence Intervals

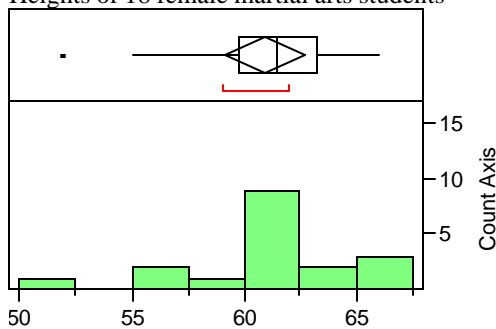
Parameter	Estimate	Lower CI	Upper CI	1-Alpha
Mean	63.90909	61.99883	65.81935	0.950

Parameter	Estimate	Lower CI	Upper CI	1-Alpha
Mean	63.90909	62.32848	65.48971	0.900

Parameter	Estimate	Lower CI	Upper CI	1-Alpha
Mean	63.90909	61.3083	66.50988	0.990

As the confidence levels increase, the confidence intervals get wider. The concern with this data set is the skew and the outlier, a very short 12-year-old boy, for the sample of size 22.

Heights of 18 female martial arts students



Confidence Intervals

Parameter	Estimate	Lower CI	Upper CI	1-Alpha
Mean	60.88889	59.09274	62.68504	0.950

Parameter	Estimate	Lower CI	Upper CI	1-Alpha
Mean	60.88889	59.40791	62.36987	0.900

Parameter	Estimate	Lower CI	Upper CI	1-Alpha
Mean	60.88889	58.42154	63.35624	0.990

The concern with this data set is also the slight skew and the outlier, a very short 12-year-old girl, for the sample of size 18.