

## Lab Handout

## Lab 5.2: Classical Confidence Intervals

The instructions below are keyed to the lab instructions found on pp. 280-281 of the text. Please use those instructions as well in preparing your report.

### Experimental Procedure

1. Use macro LAB5\_2 to generate 100 data sets (or, if you prefer, samples), each of size 20 from the C+E model  $Y = \mu + \epsilon$ , with  $\epsilon \sim N(0, \sigma^2)$ , for your own choice of  $\mu$  and  $\sigma^2$ . Input a contamination level of zero, which means that the random errors are really normal.<sup>1</sup>

For each data set the macro will calculate a level 0.95 confidence interval for  $\mu$ . All 100 confidence intervals will be displayed in the graphics window.

- (a),(b) Count the number of the confidence intervals that do not contain  $\mu$  (these are colored red in the plot) and record this number in the table given below. In the same table record the mean width of the confidence intervals, which will be written in the input window after each run of the macro.
2. ,3. Run macro LAB5\_2 several times using different values for the confidence level and the contamination level. Remember to use the same  $\mu$  and  $\sigma^2$  each time. You may want to summarize your explorations by filling in a table like the following:

	Number of samples	Sample size	Confidence level	Contamination level	Mean width	Number of red bars
Trial1	100	20	0.95	0		
Trial2	100	50	0.95	0		
Trial3	100	20	0.50	0		
Trial4	100	20	0.95	0.1		
Trial5	100	20	0.95	0.5		

(Number of samples is the number of data sets the macro will generate and the sample size equals the number of observations per data set). Include your table with your lab report.

4. Some questions you may want to consider are:
  - (a) For a given sample size and confidence level, how does contamination level affect the proportion of red bars? How does it affect the mean width?
  - (b) For a given sample size and contamination level, how does the confidence level affect the proportion of red bars? How does it affect the mean width?
  - (c) For a given confidence level and contamination level, how does sample size affect the proportion of red bars? How does it affect the mean width?

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<sup>1</sup>The contamination level shows the proportion of non-normal errors ( $\epsilon$ s) that will be generated. These non-normal errors simulate outliers. The text has a more detailed explanation on p. 281.