Central Limit Theorem: Central Limit Theorem Lab I*

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Class Time:
Names:

1 Student Learning Outcomes:

- The student will demonstrate and compare properties of the Central Limit Theorem.

NOTE: This lab works best when sampling from several classes and combining data.

2 Collect the Data

1. Count the change in your pocket. (Do not include bills.)
2. Randomly survey 30 classmates. Record the values of the change.

_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Table 1

3. Construct a histogram. Make 5 - 6 intervals. Sketch the graph using a ruler and pencil. Scale the axes.

*Version 1.10: Jun 3, 2012 10:17 am -0500
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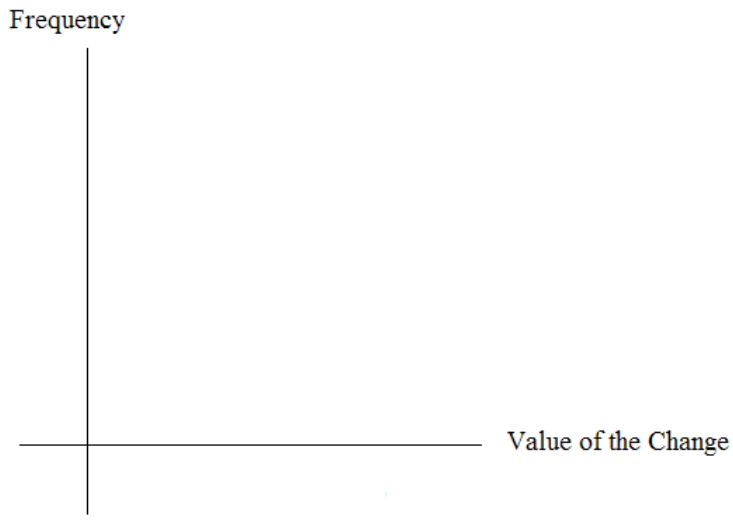

Figure 1

4. Calculate the following ($n = 1$; surveying one person at a time):
   a. $\overline{x} =$
   b. $s =$
5. Draw a smooth curve through the tops of the bars of the histogram. Use $1 - 2$ complete sentences to describe the general shape of the curve.

3 Collecting Averages of Pairs

Repeat steps 1 - 5 (of the section above titled "Collect the Data") with one exception. Instead of recording the change of 30 classmates, record the average change of 30 pairs.

1. Randomly survey 30 **pairs** of classmates. Record the values of the average of their change.

_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Table 2

2. Construct a histogram. Scale the axes using the same scaling you did for the section titled "Collecting the Data". Sketch the graph using a ruler and a pencil.

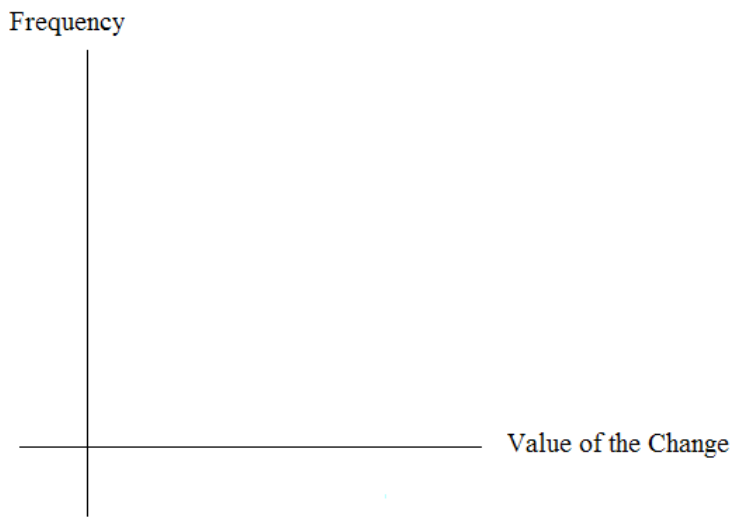

Figure 2

3. Calculate the following ($n = 2$; surveying two people at a time):
   a. $\overline{x} =$
   b. $s =$
4. Draw a smooth curve through tops of the bars of the histogram. Use $1 - 2$ complete sentences to describe the general shape of the curve.

4 Collecting Averages of Groups of Five

Repeat steps $1 - 5$ (of the section titled "Collect the Data") with one exception. Instead of recording the change of 30 classmates, record the average change of 30 groups of 5.

1. Randomly survey 30 **groups of 5** classmates. Record the values of the average of their change.

_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Table 3

2. Construct a histogram. Scale the axes using the same scaling you did for the section titled "Collect the Data". Sketch the graph using a ruler and a pencil.

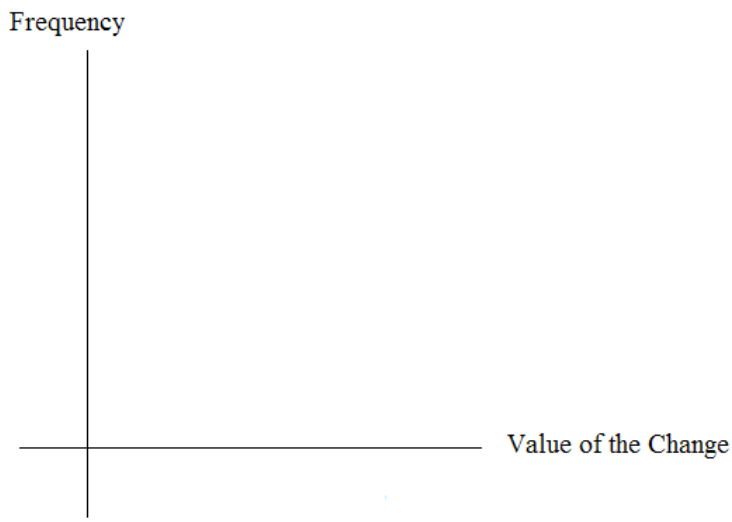

Figure 3

3. Calculate the following ($n = 5$; surveying five people at a time):
   a. $\overline{x} =$
   b. $s =$
4. Draw a smooth curve through tops of the bars of the histogram. Use $1 - 2$ complete sentences to describe the general shape of the curve.

5 Discussion Questions

1. As n changed, why did the shape of the distribution of the data change? Use $1 - 2$ complete sentences to explain what happened.
2. In the section titled "Collect the Data", what was the approximate distribution of the data? $X \sim$
3. In the section titled "Collecting Averages of Groups of Five", what was the approximate distribution of the averages? $\overline{X} \sim$
4. In $1 - 2$ complete sentences, explain any differences in your answers to the previous two questions.