

Lab 1: Central Limit Theorem (Pocket Change)

Class Time:

Names:

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.

Collect the Data

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

TABLE 1

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

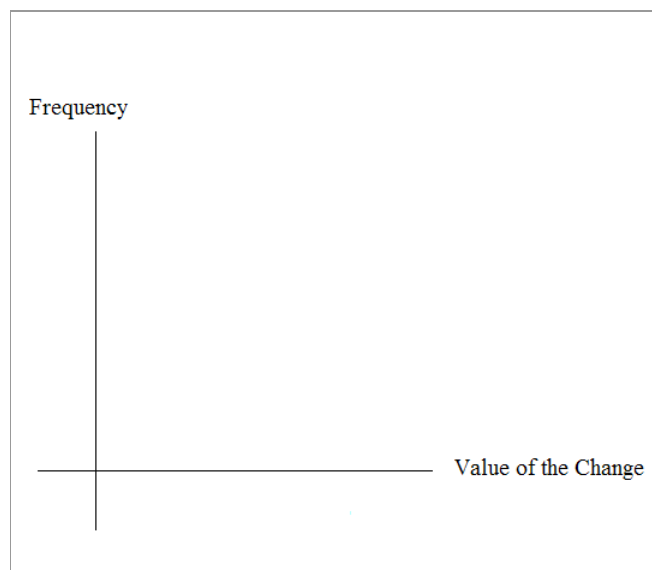


Figure 1

4. Calculate the following ($n = 1$; surveying one person at a time):

a. $\bar{x} =$

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.

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.

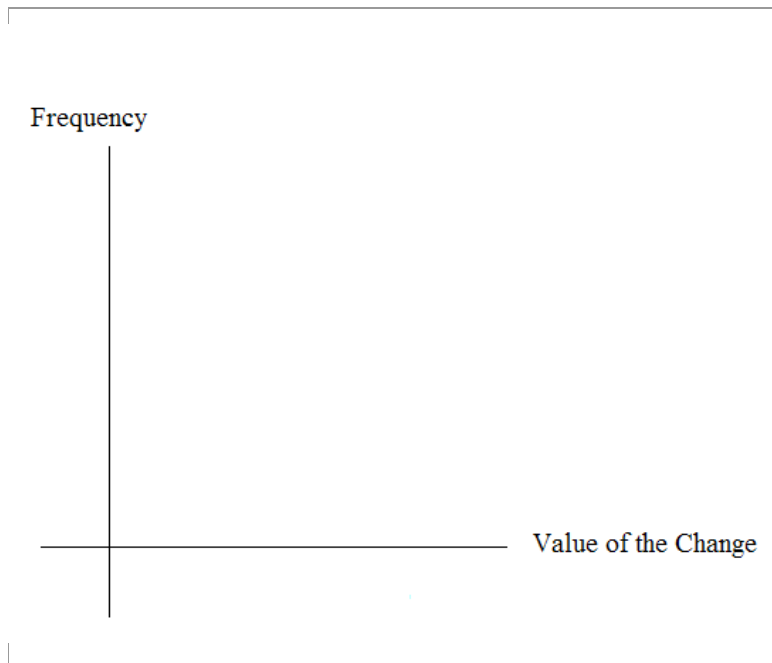


Figure 2

3. Calculate the following ($n=2$; surveying two people at a time):

a. $\bar{x} =$

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.

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.

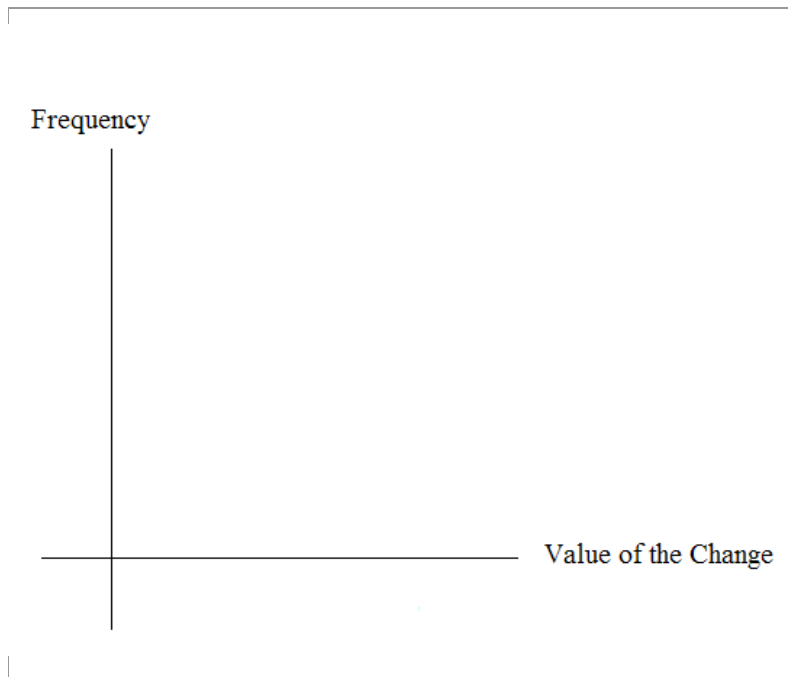


Figure 3

3. Calculate the following ($n=5$; surveying five people at a time):

a. $\bar{x} =$

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.

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? $\bar{X} \sim$
4. In 1 – 2 complete sentences, explain any differences in your answers to the previous two questions.