

CONFIDENCE INTERVALS: PRACTICE 2*

Susan Dean
Barbara Illowsky, Ph.D.

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1 Student Learning Outcomes

- The student will explore the properties of confidence intervals for averages when the population standard deviation is unknown.

2 Given

The following real data are the result of a random survey of 39 national flags (with replacement between picks) from various countries. We are interested in finding a confidence interval for the true average number of colors on a national flag. Let X = the number of colors on a national flag.

X	Freq.
1	1
2	7
3	18
4	7
5	6

Table 1

3 Calculating the Confidence Interval

Exercise 1

Calculate the following:

- $\bar{x} =$
- $s_x =$
- $n =$

(Solution on p. 4.)

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Exercise 2 *(Solution on p. 4.)*

Define the Random Variable, \bar{X} , in words. $\bar{X} =$ _____

Exercise 3 *(Solution on p. 4.)*

What is \bar{x} estimating?

Exercise 4 *(Solution on p. 4.)*

Is σ_x known?

Exercise 5 *(Solution on p. 4.)*

As a result of your answer to (4), state the exact distribution to use when calculating the Confidence Interval.

4 Confidence Interval for the True Average Number

Construct a 95% Confidence Interval for the true average number of colors on national flags.

Exercise 6 *(Solution on p. 4.)*

How much area is in both tails (combined)? $\alpha =$

Exercise 7 *(Solution on p. 4.)*

How much area is in each tail? $\frac{\alpha}{2} =$

Exercise 8 *(Solution on p. 4.)*

Calculate the following:

- a. lower limit =
- b. upper limit =
- c. error bound =

Exercise 9 *(Solution on p. 4.)*

The 95% Confidence Interval is:

Exercise 10

Fill in the blanks on the graph with the areas, upper and lower limits of the Confidence Interval and the sample mean.

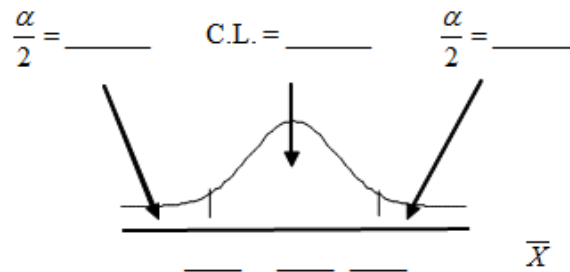


Figure 1

Exercise 11

In one complete sentence, explain what the interval means.

5 Discussion Questions

Exercise 12

Using the same \bar{x} , s_x , and level of confidence, suppose that n were 69 instead of 39. Would the error bound become larger or smaller? How do you know?

Exercise 13

Using the same \bar{x} , s_x , and $n = 39$, how would the error bound change if the confidence level were reduced to 90%? Why?

Solutions to Exercises in this Module

Solution to Exercise 1 (p. 1)

- a. 3.26
- b. 1.02
- c. 39

Solution to Exercise 2 (p. 2)

the average number of colors of 39 flags

Solution to Exercise 3 (p. 2)

μ

Solution to Exercise 4 (p. 2)

No

Solution to Exercise 5 (p. 2)

t_{38}

Solution to Exercise 6 (p. 2)

0.05

Solution to Exercise 7 (p. 2)

0.025

Solution to Exercise 8 (p. 2)

- a. 2.93
- b. 3.59
- c. 0.33

Solution to Exercise 9 (p. 2)

2.93; 3.59

