

CONFIDENCE INTERVALS: PRACTICE 1*

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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 known.

2 Given

The average age for all Foothill College students for Fall 2005 was 32.7. The population standard deviation has been pretty consistent at 15. Twenty-five Winter 2006 students were randomly selected. The average age for the sample was 30.4. We are interested in the true average age for Winter 2006 Foothill College students. (http://research.fhda.edu/factbook/FHdemofs/Fact_sheet_fh_2005f.pdf†)

Let X = the age of a Winter 2006 Foothill College student

3 Calculating the Confidence Interval

Exercise 1 *(Solution on p. 4.)*

$\bar{x} =$

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

$n =$

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

15=(insert symbol here)

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

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

$\bar{X} =$

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

What is \bar{x} estimating?

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

Is σ_x known?

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¹http://research.fhda.edu/factbook/FHdemofs/Fact_sheet_fh_2005f.pdf



Exercise 7

(Solution on p. 4.)

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

4 Explaining the Confidence Interval

Construct a 95% Confidence Interval for the true average age of Winter 2006 Foothill College students.

Exercise 8

(Solution on p. 4.)

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

Exercise 9

(Solution on p. 4.)

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

Exercise 10

(Solution on p. 4.)

Identify the following specifications:

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

Exercise 11

(Solution on p. 4.)

The 95% Confidence Interval is: _____

Exercise 12

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

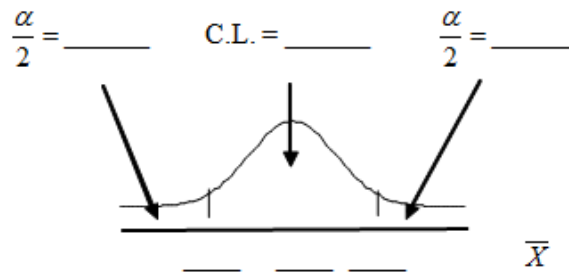


Figure 1

Exercise 13

In one complete sentence, explain what the interval means.



5 Discussion Questions

Exercise 14

Using the same mean, standard deviation and level of confidence, suppose that n were 69 instead of 25. Would the error bound become larger or smaller? How do you know?

Exercise 15

Using the same mean, standard deviation and sample size, 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)

30.4

Solution to Exercise 2 (p. 1)

25

Solution to Exercise 3 (p. 1)

σ

Solution to Exercise 4 (p. 1)

the average age of 25 randomly selected Winter 2006 Foothill students

Solution to Exercise 5 (p. 1)

μ

Solution to Exercise 6 (p. 1)

yes

Solution to Exercise 7 (p. 2)

Normal

Solution to Exercise 8 (p. 2)

0.05

Solution to Exercise 9 (p. 2)

0.025

Solution to Exercise 10 (p. 2)

a. 24.52

b. 36.28

c. 5.88

Solution to Exercise 11 (p. 2)

(24.52, 36.28)