Confidence Intervals: Practice 3*

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1 Student Learning Outcomes

- The student will calculate confidence intervals for proportions.

2 Given

The Ice Chalet offers dozens of different beginning ice-skating classes. All of the class names are put into a bucket. The 5 P.M., Monday night, ages 8 - 12, beginning ice-skating class was picked. In that class were 64 girls and 16 boys. Suppose that we are interested in the true proportion of girls, ages 8 - 12, in all beginning ice-skating classes at the Ice Chalet. Assume that the children in the selected class is a random sample of the population.

3 Estimated Distribution

Exercise 1
What is being counted?

Exercise 2 *(Solution on p. 4.)*
In words, define the Random Variable X. $X =$

Exercise 3 *(Solution on p. 4.)*
Calculate the following:

a. $x =$
b. $n =$
c. $p' =$

Exercise 4 *(Solution on p. 4.)*
State the estimated distribution of X. $X \sim$

Exercise 5 *(Solution on p. 4.)*
Define a new Random Variable P'. What is p' estimating?

Exercise 6 *(Solution on p. 4.)*
In words, define the Random Variable P' . $P' =$

*Version 1.13: Jun 9, 2012 8:04 am -0500
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Exercise 7
State the estimated distribution of P'. $P' \sim$

4 Explaining the Confidence Interval

Construct a 92% Confidence Interval for the true proportion of girls in the age 8 - 12 beginning ice-skating classes at the Ice Chalet.

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.)*
Calculate the following:

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

Exercise 11 *(Solution on p. 4.)*
The 92% 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 proportion.

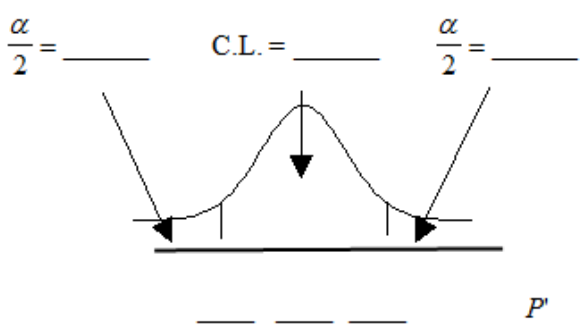

Figure 1

Exercise 13
In one complete sentence, explain what the interval means.

5 Discussion Questions

Exercise 14

Using the same p' and level of confidence, suppose that n were increased to 100. Would the error bound become larger or smaller? How do you know?

Exercise 15

Using the same p' and $n = 80$, how would the error bound change if the confidence level were increased to 98%? Why?

Exercise 16

If you decreased the allowable error bound, why would the minimum sample size increase (keeping the same level of confidence)?

Solutions to Exercises in this Module

Solution to Exercise (p. 1)
The number of girls, age 8-12, in the beginning ice skating class
Solution to Exercise (p. 1)

a. 64
b. 80
c. 0.8

Solution to Exercise (p. 1)
$B\,(80, 0.80)$
Solution to Exercise (p. 1)
p
Solution to Exercise (p. 1)
The proportion of girls, age 8-12, in the beginning ice skating class.
Solution to Exercise (p. 2)
1 - 0.92 = 0.08
Solution to Exercise (p. 2)
0.04
Solution to Exercise (p. 2)

a. 0.72
b. 0.88
c. 0.08

Solution to Exercise (p. 2)
(0.72; 0.88)