CONFIDENCE INTERVAL: PRACTICE 2; CONFIDENCE INTERVALS FOR AVERAGES, UNKNOWN POPULATION STANDARD DEVIATION

STUDENT LEARNING OUTCOMES:

* THE STUDENT WILL EXPLORE THE PROPERTIES OF CONFIDENCE INTERVALS FOR AVERAGES, AS WELL AS THE PROPERTIES OF AN UNKNOWN POPULATION STANDARD DEVIATION.

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

CALCULATING THE CONFIDENCE INTERVAL

1. Calculate the following:
    a. $\bar{x}$ = _____
    b. s_X = _____
    c. n = _____

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

3. What is $\bar{x}$ estimating?

4. Is σ_x known?

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

Construct a 95% Confidence Interval for the true average number of colors on national flags.
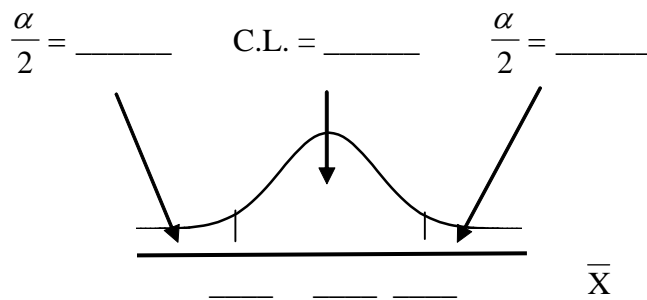
6. How much area is in both tails (combined)? $\alpha = $ _____

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

8. lower limit = _____ upper limit = _____ error bound = _____

9. The 95% Confidence Interval is: _____

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

$\dfrac{\alpha}{2} = $ _____   C.L. = _____ $\dfrac{\alpha}{2} = $ _____

$\overline{X}$

11. In one complete sentence, explain what the interval means.

DISCUSSION QUESTIONS

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?

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?