CI FOR PROPORTION AND MEAN

TEXT:

LAST NAME	FIRST NAME	DATE

1 (4 points)**.** For a class project, a political science student at a large university wants to estimate the percent of students who are registered voters. He surveys 50 students and finds that 32 are registered voters.

(a) Find the point estimate for the population proportion of registered voters.

(b) Find a 90% confidence interval for the proportion of students who are registered voters.

(c) Find the minimal sample size required for computing a 95% confidence interval with the margin of error of 0.03.

(d) True or false: if we increase the confidence level while keeping the sample size the same, then the margin of error will also increase.

2 (4 points)**.** In a sample of 812 Web ad banners, the mean width is 683 pixels and the standard deviation of the width is 86 pixels. Find a 99.5% confidence interval for the population mean width of a Web ad banner.

$\alpha =$ $t_{\alpha/2,n-1} =$

99.5% CI: MOE $=$

3 (4 points)**.** A hospital is trying to cut down on emergency room wait times. It is interested in the amount of time patients must wait before being called back to be examined. An investigation committee randomly surveyed 7 patients and their waiting times (in minutes) were recorded:

$$50, \quad 81, \quad 40, \quad 43, \quad 91, \quad 49, \quad 114$$

(a) Describle the approximate distribution of the statistic:

$$\frac{\overline{x}-\mu}{s/\sqrt{n}} \sim$$

(b) Find the point estimate for the population mean waiting time.

(c) Construct a 93% confidence interval for the population mean time spent waiting.

(d) What is the margin of error for this interval?

(e) Find the minimal sample size required for computing a 99% confidence interval with the margin of error of 5 minutes.

4 (4 points)**.** In a sample of 28 russet potatos, the mean weight is 1.27 lb and the standard deviation of the weight is 0.12 lb. Find an 80% confidence interval for the population mean weight of a russet potato.

$\alpha =$ $t_{\alpha/2,n-1} =$

80% CI: MOE $=$

5 (5 points)**.** During this activity, you will construct 10 (or more) 80% confidence interval estimates for the expected value of the fair six-sided die: 5 interval using normal critical points, and the other 5 using the t distribution. To construct one pair of intervals, roll 5 dice, compute the sample mean and construct intervals

$$\overline{x} \pm z_{\alpha/2}\frac{s}{\sqrt{n}} \qquad \text{and} \qquad \overline{x} \pm t_{\alpha/2,n-1}\frac{s}{\sqrt{n}}$$

For each interval, determine whether it contains the true population mean $\mu = 3.5$.

z-based interval	has μ?	t-based interval	has μ?

(a) What percentage of your z-based intervals contained the true mean?

(b) What percentage of your t-based intervals contained the true mean?

(c) Follow your instructor's directions to collate all of the data obtained into one big sample. What percentage of your z-based intervals contained the true mean?

(d) In the collated sample, what percentage of your t-based intervals contained the true mean?

6. Use the "Random Article" feature of Wikipedia to construct a 90% confidence interval for the proportion of articles about specific persons, with the margin of error of about 10%. An article qualifies if it is named after a real (not imaginary) person or persons who are its main subject.

$x =$ $n =$

90% CI: MOE $\approx$

7. Consider the popualation of all Wikipedia articles. Think of four different variables you could meausure objectively, with an automated process, something like *the number of words in an article*.

1. (nominal)
2. (ordinal)
3. (discrete)
4. (continuous)

Now think of four different variables that would be difficult to measure objectively, or really hard to automate (without some kind of AI), such as *whether the article is about a real person*.

1. (nominal)
2. (ordinal)
3. (discrete)
4. (continuous)

8. Try running a hypothesis test for the mean, for a sample of size $n = 1$. Pick any number for the data, and any number for μ_0. Explain why this kind of test cannot be performed.