You have 25 minutes. Take your time! Name: A. Student

ONE: A general expression for a confidence interval for the mean is:

\[ P\left(\bar{x} - t_{\alpha/2,n-1} \cdot \frac{S_x}{\sqrt{n}} < \mu < \bar{x} + t_{\alpha/2,n-1} \cdot \frac{S_x}{\sqrt{n}}\right) = 1 - \alpha. \]

Answer the following questions. An example of a perfect answer is given for one of the questions.

a. What is \( \bar{x} \)? sample mean
b. What is \( \mu \)? population mean
c. What is \( \alpha \)? significance level
d. What is \( n-1 \)? degrees of freedom
e. What is \( t \)? critical quantile from the Student's \( t \) distribution
f. Could we use something other than \( t_{\alpha/2,n-1} \)? If so, what, and when?

yes \( \frac{\bar{x} \pm \frac{S_x}{\sqrt{n}}}{} \) if \( n \geq 100 \) (n \( \geq 30 \) in many books)

TWO: A recent Canadian poll reported voting preferences. For example, 9% said they planned on voting for the green party. Beneath, it said: "margin of error plus or minus 3.1 percentage points, 19 times out of 20". What is 19/20 and what does this latter phrase really mean? Explain as fully as you can.

this is a 95% confidence interval

\[ \bar{x} = 9\% \text{ and the CI. half-width is } \pm 3.1\% \]

note that \[ \frac{19}{20} = 0.95 \text{ in } 95\% \]

THREE: What is the difference between a parameter and a statistic?

a parameter is an attribute of a population
a statistic is an attribute of a sample

FOUR: Draw a probability density histogram for the outcome from a roll of a single die. Label it fully.