Confidence Intervals: z-interval vs t-interval

Sometimes the standard deviation for the population is known (σ) and we can use the following to find the confidence interval:

$$CI = \bar{x} \pm z\frac{\sigma}{\sqrt{n}}$$ ← need to know σ (the pop. stand. dev.)

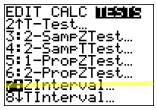
Sometimes we don't know σ, so we use s_x in place of σ. Technically, this is not correct since now we should be creating a t-interval rather than a z-interval. For simplicity, in this course, we will continue to calculate the CI by hand using s_x if we don't know σ.

* If you are using the calculator, be sure to choose z-interval when σ is know and t-interval when σ is unknown.

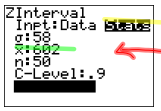
Example

A SRS of 50 families is NS were asked for the total amount spent monthly on food. $\bar{x} = \$602$ & $s_x = \$62$. From an earlier census we know $\sigma = \$58$. Calculate a 90% CI for the average monthly food bill for NS families.

↑ Sampling distribution.

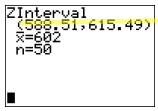


← use z-interval since σ is known



← use Stats since we only know $\bar{x}$ and σ we don't know if normal.

Since $n \geq 50$ we can find a CI even though



← We are 90% confident that the average monthly food bill for NS families is ($588.51, $615.49) using this method

What if only 20 families were surveyed, rather than 50? How would this result change?

Since we were not told that the population of monthly food bills followed a normal distribution and $n < 30$, then we cannot find a confidence interval.

In your text: p 234 to 239

* TEXT does not cover z-scores!!