The Case for Confidence Intervals

$\bar{x}$ is the best predictor for μ but it's not perfect!

Key Definitions:

Confidence Interval: a range of values that we believe contain the population parameter (unknown mean)

Margin of Error (MOE) or $\in$: The largest distance from the point estimate that should contain μ

Level of Significance (α): The probability of a Type I error.

Confidence Level (1-α): How confident we are that the interval estimate contains μ. The level is expressed as a percentage, usually 95% or 99%.

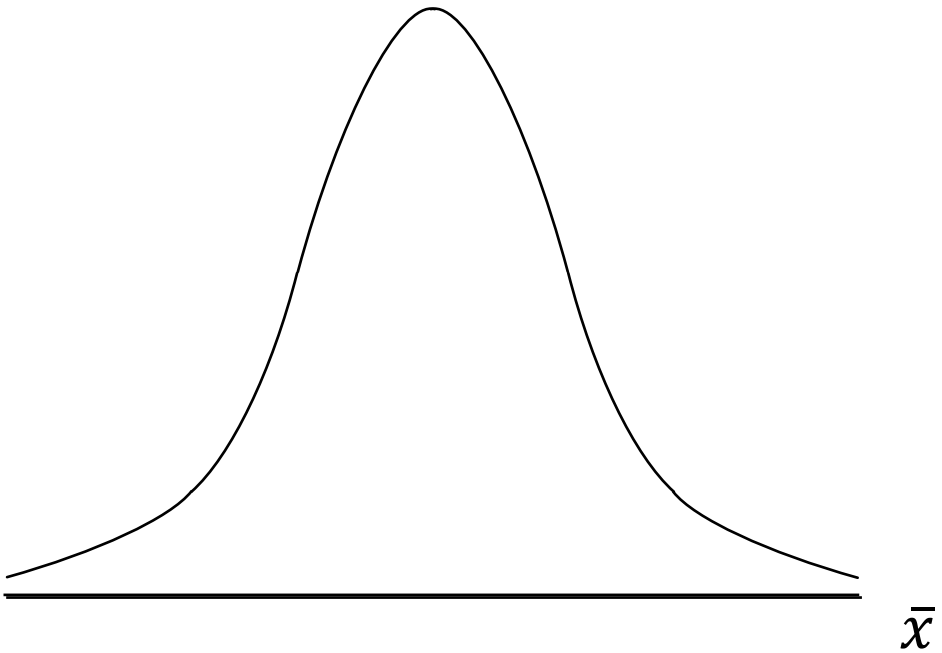
Confidence Coefficient: The confidence level stated as a proportion. Usually 0.95 or 0.99.

Process: Take random samples from the population. There's a risk that our sample will NOT contain the actual μ. In order to account for this, we build a confidence interval.

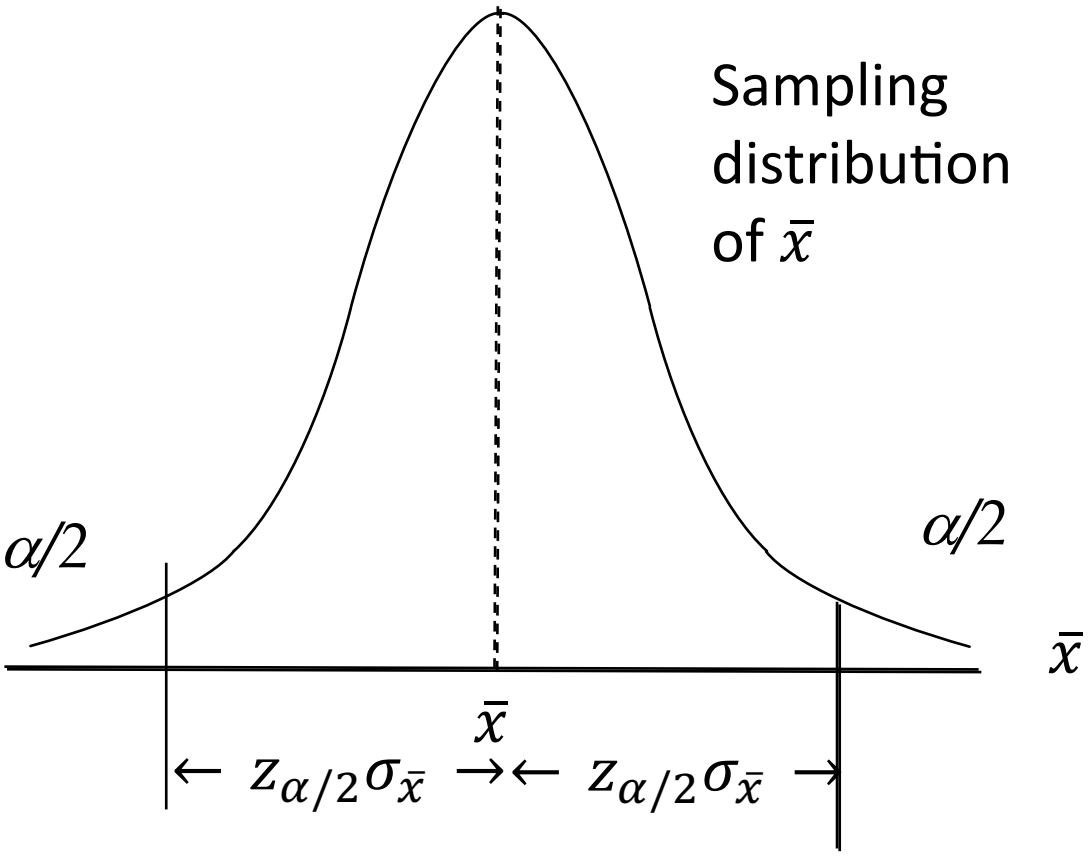
Sample Case Study

We are interested in Carey students reading habits. A survey of 30 Carey students finds that they read on average 15.7 hours per week. If the margin of error is 2.2 hours at a 95% confidence level, construct the confidence interval.

Let's do it without the formulas 1st.



Creating an Interval:



Interval Estimate Formula

$$\bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

where: $\bar{x}$ is the sample mean

1 - α is the confidence coefficient

$z_{\alpha/2}$ is the *z* value providing an area of

$\alpha/2$ in the tails tail of the standard normal probability distribution

σ is the population standard deviation

n is the sample size