Confidence Intervals: Summary of Formulas[*]

Susan Dean
Barbara Illowsky, Ph.D.

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Formula 1: General form of a confidence interval

$(\text{lower value}, \text{upper value}) = (\text{point estimate} - \text{error bound}, \text{point estimate} + \text{error bound})$

Formula 2: To find the error bound when you know the confidence interval

$\text{error bound} = \text{upper value} - \text{point estimate} \qquad \text{OR} \qquad \text{error bound} = \frac{\text{upper value} - \text{lower value}}{2}$

Formula 3: Single Population Mean, Known Standard Deviation, Normal Distribution

Use the Normal Distribution for Means[1] $\qquad \text{EBM} = z_{\frac{\alpha}{2}} \cdot \frac{\sigma}{\sqrt{n}}$

The confidence interval has the format $(\overline{x} - \text{EBM}, \overline{x} + \text{EBM})$.

Formula 4: Single Population Mean, Unknown Standard Deviation, Student's-t Distribution

Use the Student's-t Distribution with degrees of freedom $\text{df} = n - 1$. $\text{EBM} = t_{\frac{\alpha}{2}} \cdot \frac{s}{\sqrt{n}}$

Formula 5: Single Population Proportion, Normal Distribution

Use the Normal Distribution for a single population proportion $p' = \frac{x}{n}$

$\text{EBP} = z_{\frac{\alpha}{2}} \cdot \sqrt{\frac{p' \cdot q'}{n}} \qquad p' + q' = 1$

The confidence interval has the format $(p' - \text{EBP}, p' + \text{EBP})$.

Formula 6: Point Estimates

$\overline{x}$ is a point estimate for μ

p' is a point estimate for ρ

s is a point estimate for σ