Confidence Intervals & Margin of Error Cheat Sheet

Type	Condition	Confidence Interval	Margin of Error	Notes
Population Mean	σ is known n is large ($n>30$)	$\bar{X} \pm z\sqrt{\frac{\sigma^2}{n}}$	$z\sqrt{\frac{\sigma^2}{n}}$	z is the critical value associated with the standard normal distribution.
	σ is known n is small ($n \leq 30$)	$\bar{X} \pm t_{n-1}\sqrt{\frac{\sigma^2}{n}}$	$t_{n-1}\sqrt{\frac{\sigma^2}{n}}$	t_{n-1} is the critical value associated with the t distribution having $n-1$ d.o.f.
	σ is known n is small ($n \leq 30$) $X \sim N(\mu, \sigma^2)$	$\bar{X} \pm z\sqrt{\frac{\sigma^2}{n}}$	$z\sqrt{\frac{\sigma^2}{n}}$	z is the critical value associated with the standard normal distribution.
	σ is unknown n is large ($n>30$)	$\bar{X} \pm z\sqrt{\frac{s^2}{n}}$	$z\sqrt{\frac{s^2}{n}}$	z is the critical value associated with the standard normal distribution.
	σ is unknown n is small ($n \leq 30$)	$\bar{X} \pm t_{n-1}\sqrt{\frac{s^2}{n}}$	$t_{n-1}\sqrt{\frac{s^2}{n}}$	t_{n-1} is the critical value associated with the t distribution having $n-1$ d.o.f.
Population Proportion		$p \pm z\sqrt{\frac{p(1-p)}{n}}$	$z\sqrt{\frac{p(1-p)}{n}}$	z is the critical value associated with the standard normal distribution.
Difference between Population Proportions		$p_1 - p_2 \pm z\sqrt{\frac{p_1(1-p_1)}{n_1} + \frac{p_2(1-p_2)}{n_2}}$	$z\sqrt{\frac{p_1(1-p_1)}{n_1} + \frac{p_2(1-p_2)}{n_2}}$	z is the critical value associated with the standard normal distribution.
Difference between Population Means	σ_1, σ_2 are known	$\bar{X}_1 - \bar{X}_2 \pm z\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$	$z\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$	z is the critical value associated with the standard normal distribution.
	σ_1, σ_2 are unknown σ_1, σ_2 are unequal n_1, n_2 are large	$\bar{X}_1 - \bar{X}_2 \pm z\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$	$z\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$	z is the critical value associated with the standard normal distribution.
	σ_1, σ_2 are unknown σ_1, σ_2 are equal	$\bar{X}_1 - \bar{X}_2 \pm t_{n_1+n_2-2}\sqrt{s_p^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$	$t_{n_1+n_2-2}\sqrt{s_p^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$	$t_{n_1+n_2-2}$ is the critical value associated with the t distribution having n_1+n_2-2 d.o.f.

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