Name	Formula	Additional Notes
Confidence Interval (CI)	$\mathrm{CI} = \hat{\theta} \pm \mathrm{MoE}$	$\hat{\theta}$: point (sample) estimate, MoE: margin of error
Margin of Error (MoE)	$\mathrm{MoE} = \text{Critical Value} \times \mathrm{SE}$	Critical value is $z_{1-\frac{\alpha}{2}}$ or $t_{df,1-\frac{\alpha}{2}}$. SE: standard error of estimate. Lower $\alpha \implies$ larger MoE.
SE (sample proportion)	$\mathrm{SE}(\hat{p}) = \sqrt{\dfrac{\hat{p}\,(1-\hat{p})}{n}}$	for CI use $\hat{p}$ in SE; n: sample size
Test statistic (one proportion)	$Z = \dfrac{\hat{p}-p_0}{SE(p_0)} = \dfrac{\hat{p}-p_0}{\sqrt{p_0(1-p_0)/n}}$	p_0: null value of p; for test use p_0 in SE. Large sample approx. valid when $n\hat{p} \geq 15$ and $n(1-\hat{p}) \geq 15$ (Z procedures).
$SE(\hat{p}_1 - \hat{p}_2)$	$\mathrm{SE}(\hat{p}_1 - \hat{p}_2) = \sqrt{\dfrac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \dfrac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$	Unpooled SE. Use *only* for CI (or hypothesis testing with $p_1 - p_2 = \Delta_0 \neq 0$).
Test statistic (two prop., unpooled)	$Z = \dfrac{(\hat{p}_1 - \hat{p}_2) - \Delta_0}{\mathrm{SE}(\hat{p}_1 - \hat{p}_2)}$	Use unpooled SE (row above) *only* for CI (or when testing $H_0 : p_1 - p_2 = \Delta_0 \neq 0$).
Test statistic (two prop., pooled)	$Z = \dfrac{(\hat{p}_1 - \hat{p}_2) - 0}{\sqrt{\hat{p}_{\text{pool}}(1-\hat{p}_{\text{pool}}) \cdot \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$	Pooled SE used only for $H_0 : p_1 - p_2 = 0$ (i.e., $\Delta_0 = 0$). $\hat{p}_{\text{pool}} = \frac{x_1+x_2}{n_1+n_2} = \frac{n_1\hat{p}_1+n_2\hat{p}_2}{n_1+n_2}$.
SE (sample mean)	$\mathrm{SE}(\bar{X}) = \dfrac{s}{\sqrt{n}}$	s: sample standard deviation.
Test statistic (large n *use* Z procedures; small n *use* T procedures)	$Z = \dfrac{\bar{x}-\mu_0}{s/\sqrt{n}}$ (CLT), $\quad T = \dfrac{\bar{x}-\mu_0}{s/\sqrt{n}}$	μ_0: hypothesized population mean; Use $df = n-1$ for t distribution if using T procedures. Use CLT (Z procedures) if $n \geq 30$.
SE ($\bar{X}_1 - \bar{X}_2$, large n)	$\mathrm{SE}(\bar{X}_1 - \bar{X}_2) = \sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}$	$\bar{X}_1$ and $\bar{X}_2$ come from independent samples. Use Z procedures if $n_1 \geq 30$ and $n_2 \geq 30$ (CLT).
Test statistic (two means, large n)	$Z = \dfrac{(\bar{X}_1 - \bar{X}_2) - \Delta_0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$	Δ_0: hypothesized difference in means (often 0, meaning $\mu_1 - \mu_2 = 0 = \Delta_0$)
SE ($\bar{X}_1 - \bar{X}_2$, small n, pooled)	$\mathrm{SE}_{\text{pooled}} = \sqrt{S_p^2\left(\dfrac{1}{n_1} + \dfrac{1}{n_2}\right)}$, $S_p^2 = \frac{(n_1-1)s_1^2+(n_2-1)s_2^2}{n_1+n_2-2}$	pooled variance for equal population variances assumption
Test statistic (two means, small n, pooled)	$T = \dfrac{(\bar{X}_1 - \bar{X}_2) - \Delta_0}{\mathrm{SE}_{\text{pooled}}}$	Δ_0: hypothesized difference in means (often 0, meaning $\mu_1 - \mu_2 = 0 = \Delta_0$); Pooled $df = n_1 + n_2 - 2$.
SE ($\bar{X}_1 - \bar{X}_2$, small n, Welch)	$\mathrm{SE}_{\text{Welch}} = \sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}$	no pooling, used when population variances assumed unequal
Test statistic (two means, small n, Welch)	$T = \dfrac{(\bar{X}_1 - \bar{X}_2) - \Delta_0}{\mathrm{SE}_{\text{Welch}}}$, $df \approx \dfrac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{(s_1^2/n_1)^2}{n_1-1} + \frac{(s_2^2/n_2)^2}{n_2-1}}$	Δ_0: hypothesized difference in means (often 0, meaning $\mu_1 - \mu_2 = 0 = \Delta_0$); df by Welch–Satterthwaite approx.
SE (paired samples)	$\mathrm{SE}(\bar{d}\,) = \dfrac{s_d}{\sqrt{n}}$	$D_i = X_{1i} - X_{2i}$, s_d: *sample* sd of differences. Use Z for large n, T for small n.
Test statistic (paired, large n *use* Z, small n *use* T)	$Z = \dfrac{\bar{d}-\mu_d}{s_d/\sqrt{n}}$ (CLT), $\quad T = \dfrac{\bar{d}-\mu_d}{s_d/\sqrt{n}}$	μ_d: hypothesized mean difference (often 0, meaning $\mu_d = 0$). Use CLT if $n \geq 30$.