Context	Standard error	Confidence interval	Two-tail H_0	Test statistic	Distribution
One mean					
— σ known	$\mathrm{SE} = \frac{\sigma}{\sqrt{n}}$	$\bar{x} \pm (z^*)(\mathrm{SE})$	$\mu = \mu_0$	$z = \frac{\bar{x}-\mu_0}{\mathrm{SE}}$	$\mathcal{N}(0,1)$
— σ unknown	$\widehat{\mathrm{SE}} = \frac{s}{\sqrt{n}}$	$\bar{x} \pm (t^*)(\widehat{\mathrm{SE}})$	$\mu = \mu_0$	$t = \frac{\bar{x}-\mu_0}{\widehat{\mathrm{SE}}}$	$t(n-1)$
Two means					
— σ_1 and σ_2 known	$\mathrm{SE} = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$	$\bar{x}_2 - \bar{x}_1 \pm (z^*)(\mathrm{SE})$	$\mu_1 = \mu_2$	$z = \frac{\bar{x}_2-\bar{x}_1}{\mathrm{SE}}$	$\mathcal{N}(0,1)$
— σ_1 and σ_2 unknown	$\widehat{\mathrm{SE}} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$	$\bar{x}_2 - \bar{x}_1 \pm (t^*)(\widehat{\mathrm{SE}})$	$\mu_1 = \mu_2$	$t = \frac{\bar{x}_2-\bar{x}_1}{\widehat{\mathrm{SE}}}$	$t(\min(n_1, n_2) - 1)$
One proportion					
— confidence intervals	$\widehat{\mathrm{SE}} = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$	$\hat{p} \pm (z^*)(\widehat{\mathrm{SE}})$			
— hypothesis tests	$\widehat{\mathrm{SE}} = \sqrt{\frac{p_0(1-p_0)}{n}}$		$p = p_0$	$z = \frac{\hat{p}-p_0}{\widehat{\mathrm{SE}}}$	$\mathcal{N}(0,1)$
Two proportions					
— confidence intervals	$\widehat{\mathrm{SE}} = \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$	$\hat{p}_2 - \hat{p}_1 \pm (z^*)(\widehat{\mathrm{SE}})$			
— hypothesis tests	$\widehat{\mathrm{SE}} = \sqrt{\bar{p}(1-\bar{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$		$p_1 = p_2$	$z = \frac{\hat{p}_2-\hat{p}_1}{\widehat{\mathrm{SE}}}$	$\mathcal{N}(0,1)$

- μ_0 is the mean suggested by H_0, the null hypothesis.
- p_0 is the proportion suggested by H_0, the null hypothesis.
- $\bar{p} = \frac{\hat{p}_1 n_1 + \hat{p}_2 n_2}{n_1+n_2} = \frac{x_1+x_2}{n_1+n_2}$ is the pooled proportion.
- The confidence level γ is typically 0.95 and the significance level $\alpha = 1 - \gamma$ is typically 0.05.
- In two-tailed tests (= as H_0; ≠ as H_a), z^* is the value such that the area between $-z^*$ and z^* under the standard normal distribution is γ.
- In two-tailed tests, t^* is the value such that the area between $-t^*$ and t^* under the $t(df)$ distribution is γ, where df is the degrees of freedom. Typically $df = n - 1$.
- In left-tailed tests ($H_0 : \ \mu \geq \mu_0$), the value of z^* or t^* will represent upper limit of left area equal to α.
- In right-tailed tests ($H_0 : \ \mu \leq \mu_0$), the value of z^* or t^* will represent lower limit of right area equal to α.
- Some common values of z^* are listed below. For a given γ or α, we know $|t^*| \geq |z^*|$.

γ	α	two-tailed z^*	right-tail z^*	left-tail z^*
0.8	0.2	1.28	0.84	-0.84
0.9	0.1	1.64	1.28	-1.28
0.95	0.05	1.96	1.64	-1.64
0.99	0.01	2.58	2.33	-2.33
0.999	0.001	3.29	3.09	-3.09

- For two-tailed hypothesis testing:

$$\text{if } |z| > z^* \text{ then reject } H_0\text{, otherwise retain } H_0$$

$$\text{if } |t| > t^* \text{ then reject } H_0\text{, otherwise retain } H_0$$

$$p\text{-value} = 2 \cdot \Phi(-|z|)$$

$$\text{if } p\text{-value} < \alpha \text{ then reject } H_0\text{, otherwise retain } H_0$$