Normal Distribution

Parameters	μ = population mean α = population standard deviation
PDF	$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$
Domain	$-\infty < x < +\infty$
Mean	μ
Std. Dev.	σ
Shape	Symmetric, mesokurtic, and bell-shaped.
PDF in Excel*	=NORM.DIST(x, μ, σ, 0)
CDF in Excel*	=NORM.DIST(x, μ, σ, 1)
Random data in Excel	=NORM.INV(RAND(), μ, σ)

Sampling distribution of $\bar{x}$ is normal for each sample size

T vs Z

Test For	*Null Hypothesis (H_0)*	*Test Statistic*	*Distribution*	*Use When*
Population mean (μ)	$\mu = \mu_0$	$\frac{(\bar{x} - \mu_o)}{\sigma/\sqrt{n}}$	Z	Normal distribution or $n > 30$; σ known
Population mean (μ)	$\mu = \mu_0$	$\frac{(\bar{x} - \mu_o)}{s/\sqrt{n}}$	t_{n-1}	$n < 30$, and/or σ unknown
Population proportion (ρ)	$p = p_0$	$\frac{\hat{p} - p_o}{\sqrt{\frac{p_o(1-p_o)}{n}}}$	Z	$n\hat{p}$, $n(1-\hat{p}) \geq 10$
Difference of two means ($\mu_1 - \mu_2$)	$\mu_1 - \mu_2 = 0$	$\frac{(\bar{x}_1 - \bar{x}_2) - 0}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$	Z	Both normal distributions, or n_1, $n_2 \geq 30$; σ_1, σ_2 known
Difference of two means ($\mu_1 - \mu_2$)	$\mu_1 - \mu_2 = 0$	$\frac{(\bar{x}_1 - \bar{x}_2) - 0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$	t distribution with df = the smaller of n_1–1 and n_2–1	n_1, $n_2 < 30$; and/or σ_1, σ_2 unknown
Mean difference μ_d (paired data)	$\mu_d = 0$	$\frac{(\bar{d} - \mu_d)}{s_d/\sqrt{n}}$	t_{n-1}	$n < 30$ pairs of data and/or σ_d unknown
Difference of two proportions ($p_1 - p_2$)	$p_1 - p_2 = 0$	$\frac{(\hat{p}_1 - \hat{p}_2) - 0}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_1}\right)}}$	Z	$n\hat{p}$, $n(1-\hat{p}) \geq 10$ for each group