Stats Midterm Cheat Sheet

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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 x̄ 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 (p)	$p = p_0$	$\frac{\hat{p}-p_o}{\sqrt{\frac{p_o(1-p_o)}{n}}}$	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 ($p_1 - p_2$)	$p_1 - p_2 = 0$	$\frac{(\hat{p}_1-\hat{p}_2)-0}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}}$	Z	$n\hat{p}, n(1-\hat{p}) \geq 10$ for each group