Inference Cheat Sheet

Description	Case	df	Test Statistic	Confidence Interval	Other Information
1-Sample	Q	$n-1$	$t_{TS} = \dfrac{\bar{x}-\mu_o}{s/\sqrt{n}}$	$\bar{x} \pm t_{\alpha/2} \dfrac{s}{\sqrt{n}}$	
2-Samples Matched-Pairs	CQ	$n_d - 1$	$t_{TS} = \dfrac{\bar{x}_d}{s_d/\sqrt{n_d}}$	$\bar{x}_d \pm t_{\alpha/2} \dfrac{s_d}{\sqrt{n_d}}$	
2-Samples Unequal Variance	CQ	$\dfrac{\left(\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}\right)^2}{\left(\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1-1}+\frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2-1}\right)}$	$t_{TS} = \dfrac{\bar{x}_1-\bar{x}_2}{\sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}}}$	$(\bar{x}_1-\bar{x}_2) \pm t_{\alpha/2}\sqrt{\dfrac{s_1^2}{n_1}+\dfrac{s_2^2}{n_2}}$	
2-Samples Equal Variances	CQ	n_1+n_2-2	$t_{TS} = \dfrac{\bar{x}_1-\bar{x}_2}{\sqrt{s_p^2\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}}$	$(\bar{x}_1-\bar{x}_2) \pm t_{\alpha/2}\sqrt{s_p^2\left(\dfrac{1}{n_1}+\dfrac{1}{n_2}\right)}$	$s_p^2 = \dfrac{(n_1-1)s_1^2+(n_2-1)s_2^2}{n_1+n_2-2}$
1-Proportion	C	∞	$z_{TS} = \dfrac{\hat{p}-p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$	$\hat{p} \pm z_{\alpha/2}\sqrt{\dfrac{\hat{p}(1-\hat{p})}{n}}$	
2-Proportions	CC	∞	$z_{TS} = \dfrac{\hat{p}_1-\hat{p}_2}{\sqrt{\hat{p}_c(1-\hat{p}_c)\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}}$	$(\hat{p}_1-\hat{p}_2) \pm z_{\alpha/2}\sqrt{\dfrac{\hat{p}_1(1-\hat{p}_1)}{n_1}+\dfrac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$	$\hat{p}_c = \dfrac{n_1\hat{p}_1+n_2\hat{p}_2}{n_1+n_2} = \dfrac{x_1+x_2}{n_1+n_2}$
Goodness-of-Fit	C	$k-1$	$\mathrm{X}_{TS}^2 = \sum \dfrac{(O-E)^2}{E}$	N/A	$E = np_{i,0}$
Independence	CC	$(r-1)(c-1)$	$\mathrm{X}_{TS}^2 = \sum \dfrac{(O-E)^2}{E}$	N/A	$E = \dfrac{Row * Column}{GrandTotal}$
Variances	CQ	$n_1 - 1$ $n_2 - 1$	$F = \dfrac{s_1^2}{s_2^2}$	N/A	

R Cheat Sheet

Inference for sample means:

One-sample Two-sample	$H_1: \mu < \mu_0$ $H_1: \mu_1 - \mu_2 < 0$	$H_1: \mu > \mu_0$ $H_1: \mu_1 - \mu_2 > 0$	$H_1: \mu \neq \mu_0$ $H_1: \mu_1 - \mu_2 \neq 0$
Critical Value	`qt(`α`, df)`	`qt(1-`α`, df)`	`qt(1-`α`/2, df)`
p-value	`pt(t, df)`	`1-pt(t, df)`	`2*(pt(t, df))` if t is negative or `2*(1-pt(t, df))` if t is positive

Inference for sample proportions:

One-proportion Two-proportion	$H_1: p < p_0$ $H_1: p_1 - p_2 < 0$	$H_1: p > p_0$ $H_1: p_1 - p_2 > 0$	$H_1: p \neq p_0$ $H_1: p_1 - p_2 \neq 0$
Critical Value	`qnorm(`α`)`	`qnorm(1-`α`)`	`qnorm(1-`α`/2)`
p-value	`pnorm(z)`	`1-pnorm(z)`	`2*(pnorm(z))` if z is negative or `2*(1-pnorm(z))` if z is positive

Inference for variances:

Two-variances	$H_1: \sigma_1^2 - \sigma_2^2 < 0$	$H_1: \sigma_1^2 - \sigma_2^2 > 0$	$H_1: \sigma_1^2 - \sigma_2^2 \neq 0$
p-value	`pf(F, df1, df2)`	`1-pf(F, df1, df2)`	`2*(pf(F, df1, df2))` if $F < 1$ or `2*(1-pf(F, df1, df2))` if $F > 1$

Chi-square distribution:

Critical Value	`qchisq(1-`α`, df)`
p-value	`1-pchisq(`X^2`, df)`