CRAFTON HILLS COLLEGE TUTORING CENTER

Chapter 8 Hypothesis Testing for Two Samples

		Mean, μ, Independent (σ_1 & σ_2 Known) 8.1		Mean, μ, Independent (σ_1 & σ_2 Unknown) 8.2		T-Test for the Difference Between Mean, μ. 8.3		Two Pop. Proportions, $\hat{p}$ 8.4	
		Null	Alternative	Null	Alternative	Null	Alternative	Null	Alternative
Claims	Left Tailed:	$H_o: \mu_1 \geq \mu_2$	$H_a: \mu_1 < \mu_2$	$H_o: \mu_1 \geq \mu_2$	$H_a: \mu_1 < \mu_2$	$H_o: \mu \geq 0$	$H_a: \mu < 0$	$H_o: p_1 \geq p_2$	$H_a: p_1 < p_2$
	Right Tailed:	$H_o: \mu_1 \leq \mu_2$	$H_a: \mu_1 > \mu_2$	$H_o: \mu_1 \leq \mu_2$	$H_a: \mu_1 > \mu_2$	$H_o: \mu \leq 0$	$H_a: \mu > 0$	$H_o: p_1 \leq p_2$	$H_a: p_1 > p_2$
	Two Tailed:	$H_o: \mu_1 = \mu_2$	$H_a: \mu_1 \neq \mu_2$	$H_o: \mu_1 = \mu_2$	$H_a: \mu_1 \neq \mu_2$	$H_o: \mu = 0$	$H_a: \mu \neq 0$	$H_o: p_1 = p_2$	$H_a: p_1 \neq p_2$
Test Statistics *ALWAYS USE A POSITIVE TEST STAT FOR P-VALUES		$z = \frac{(\bar{x}_1 - \bar{x}_2)}{(\sigma_{\bar{x}_1 - \bar{x}_2})}$		$t = \frac{(\bar{x}_1 - \bar{x}_2)}{(s_{\bar{x}_1 - \bar{x}_2})}$		$t = \frac{(\bar{d} - \mu_d)}{\left(s_d / \sqrt{n}\right)}$ ***df:*** *n-1*		$z = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\bar{p}\bar{q}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$	
Test Statistics Calculation Notations		**Standard Error:**		**Standard Error:**		**Standard Deviation:**		**Pooled Estimate of p ($\bar{p}$):**	
		$\sigma_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{(\sigma_1)^2}{n_1} + \frac{(\sigma_2)^2}{n_2}}$		$s_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{(s_1)^2}{n_1} + \frac{(s_2)^2}{n_2}}$		$s_d = \sqrt{\frac{\sum(d - \bar{d})^2}{n - 1}}$		$\bar{p} = \frac{(x_1 + x_2)}{(n_1 + n_2)}$	
		Notations:		**When Variances is ≠:**		**Mean Average:**		**Notations:**	
		σ_1= Sample 1 pop. Standard dev. n_1= Size of Sample 1 σ_2= Sample 2 pop. Standard dev. n_2=Size of Sample 2		$s_{\bar{x}_1 - \bar{x}_2} = \hat{\sigma} \cdot \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$ ***d.f.***$= n_1 + n_2 - 2$		$\bar{d} = \frac{\sum d}{n}$ **Notations:** n = the # of pairs data in set d = the difference between n pairs $\bar{d}$ = the average of d		$\bar{q} = 1 - \bar{p}$ $\hat{p}_1 = \frac{x_1}{n_1}$ $\hat{p}_2 = \frac{x_2}{n_2}$ **When x_1 & x_2 Aren't Given:** $x_1 = \hat{p}_1 \cdot n_1$ $x_2 = \hat{p}_2 \cdot n_2$	
P-Value	Left Tailed:	=NORM.S.DIST(z,True)		=T.DIST(t,df,True)		=T.DIST(t ,$\bar{d}$,True)		=NORM.S.DIST(z,True)	
	Right Tailed:	=1 −NORM.S.DIST(z,True)		=T.DIST.RT(t,df)		=T.DIST.RT(t,$\bar{d}$)		=1-NORM.S.DIST(z,True)	
	Two Tailed:	=2*(1-NORM.S.DIST(z,True))		= T.DIST.2T(t,df)		= T.DIST.2T(t,$\bar{d}$)		=2*(1-NORM.S.DIST(z,True))	
P-value Statements:		***Please Reference Chapter 7 Handout***						**Classical Approach (Critical Values):**	
Confidence Interval:		$(\hat{p}_1 - \hat{p}_2) \pm z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}_1(1 - \hat{p}_1)}{n_1} + \frac{\hat{p}_2(1 - \hat{p}_2)}{n_2}}$		$(\bar{x}_1 - \bar{x}_2) \pm t_{\frac{\alpha}{2}} \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$ **Note**: t_o is found using the smaller of n1 - 1 or n2 – 1 *df*				**Please Reference Chapter 7 Handout**	