SUMMARY OF CHAPTER 5 TO CHAPTER 8
SCSI 2143 PROBABILITY & STATISTICAL DATA ANALYSIS

CHAPTER	TOPICS	H_0 & H_1	TEST STATISTICS / FORMULA
5 (P1) Point and Interval Estimator	Confidence Interval	-	$\hat{p} \pm (z_{cv})\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$ $\bar{x} \pm (z_{cv})\left(\frac{\sigma}{\sqrt{n}}\right)$ $s \pm (t_{cv})\left(\frac{s}{\sqrt{n}}\right)$
5 (P2) Hypothesis Testing 1-sample	Test for Proportion	$H_0: p$ = value $H_1: p \neq$ value $H_1: p <$ value $H_1: p >$ value	$z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}}$
	Test for Mean	$H_0: \mu$ = value $H_1: \mu \neq$ value $H_1: \mu <$ value $H_1: \mu >$ value	**σ^2 known** $z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$ **σ^2 unknown and $n \leq 30$** $t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$ **σ^2 unknown and $n > 30$** $z = \frac{\bar{x} - \mu}{s/\sqrt{n}}$
	Test for Variance / Standard Deviation	$H_0: \sigma$ = value $H_1: \sigma \neq$ value $H_1: \sigma <$ value $H_1: \sigma >$ value	$\chi^2 = \frac{(n-1)s^2}{\sigma^2}$

Prepared by: Suhaila Mohamad Yusuf
15th May 2019

SUMMARY OF CHAPTER 5 TO CHAPTER 8
SCSI 2143 PROBABILITY & STATISTICAL DATA ANALYSIS

CHAPTER	TOPICS	H0 & H1	TEST STATISTICS / FORMULA
5 (P3) Hypothesis Testing 2-Sample	Test for 2-Propotions	$H_0: p_1 = p_2$ $H_1: p_1 \neq p_2$ $H_1: p_1 < p_2$ $H_1: p_1 > p_2$	$\bar{p} = \frac{x_1 + x_2}{n_1 + n_2}$ $z = \frac{(\hat{p} - \hat{p}) - (p_1 - p_2)}{\sqrt{\frac{\bar{p}\bar{q}}{n_1} + \frac{\bar{p}\bar{q}}{n_2}}}$
	Test on Difference Between 2-Mean	$H_0: \mu_1 - \mu_1 = \Delta_0$ $H_1: \mu_1 \neq \mu_1$ $H_1: \mu_1 > \mu_1$ $H_1: \mu_1 < \mu_1$	**σ_1^2 and σ_1^2 known** $z = \frac{\bar{X}_1 - \bar{X}_2 - \Delta_0}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$ **σ_1^2 and σ_1^2 unknown** **Case 1: $\sigma_1^2 = \sigma_1^2$** $S_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$ $t = \frac{\bar{X}_1 - \bar{X}_2 - \Delta_0}{S_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$ **σ_1^2 and σ_1^2 unknown** **Case 2: $\sigma_1^2 \neq \sigma_1^2$** $t = \frac{\bar{X}_1 - \bar{X}_2 - \Delta_0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$ $v = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{\left(s_1^2/n_1\right)^2}{n_1 - 1} + \frac{\left(s_2^2/n_2\right)^2}{n_2 - 1}}$

Prepared by: Suhaila Mohamad Yusuf

15th May 2019

SUMMARY OF CHAPTER 5 TO CHAPTER 8
SCSI 2143 PROBABILITY & STATISTICAL DATA ANALYSIS

CHAPTER	TOPICS	H_0 & H_1	TEST STATISTICS / FORMULA
5 (P3) Hypothesis Testing 2-Sample	Test on Difference Between 2-Variance / Standard Deviation	$H_0: \sigma_1 = \sigma_2$ $H_1: \sigma_1 \neq \sigma_2$ $H_1: \sigma_1 > \sigma_2$ $H_1: \sigma_1 < \sigma_2$	$F = \frac{S_1^2}{S_2^2}$
	Test on 2-Dependent Samples (Matched Pair)	$H_0: \mu_D = 0$ $H_1: \mu_D \neq 0$ $H_1: \mu_D > 0$ $H_1: \mu_D < 0$	$s_D = \sqrt{\frac{\sum D^2 - \frac{(\sum D)^2}{n}}{n-1}}$ $t = \frac{\bar{D} - \mu_D}{\frac{s_D}{\sqrt{n}}}$
6 Chi-Square & Cont. Table	1-Way Contingency	**Equal Frequencies** $H_0: p_1 = p_2 = \cdots = p_k$ H_1: at least one p is different	$E = \frac{n}{k}$
		Unequal Frequencies $H_0: p_1 = p_2 = \cdots = p_k$ as claimed H_1: at least one p is different	$E = np$
			$\chi^2 = \sum \frac{(O - E)^2}{E}$
	2-way Contingency	H_0: Variables are independent H_1: Variables are dependent	$E = \frac{(i^{th} Row\ Total)(j^{th} Column\ Total)}{Total\ Sample\ Size}$ $\chi^2 = \sum \frac{(O_{i,j} - E_{i,j})^2}{E_{i,j}}$

Prepared by: Suhaila Mohamad Yusuf

15th May 2019

SUMMARY OF CHAPTER 5 TO CHAPTER 8
SCSI 2143 PROBABILITY & STATISTICAL DATA ANALYSIS

CHAPTER	TOPICS	H0 & H1	TEST STATISTICS / FORMULA
7 (P1)	Correlation		**Both Interval/Ratio Data** $r = \frac{\sum xy - \frac{(\sum x \sum y)}{n}}{\sqrt{\left((\sum x^2) - \frac{(\sum x)^2}{n}\right)\left((\sum y^2) - \frac{(\sum y)^2}{n}\right)}}$ **Both Ordinal Data** $r_s = 1 - \frac{6 \sum d_i^{\ 2}}{n(n^2 - 1)}$
		$H_0: \rho = 0$ (no correlation) $H_1: \rho \neq 0$ (correlation exists)	$t = \frac{r}{\sqrt{\frac{1 - r^2}{n - 2}}}$
7 (P2)	Regression		$\hat{y} = b_0 + b_1 x$ $b_1 = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}}$ $b_0 = \bar{y} - b_1 \bar{x}$
		$H_0: \beta_1 = 0$ $H_1: \beta_1 \neq 0$	$t = \frac{b_1 - \beta_1}{s_{b_1}}$
8 ANOVA	1-way ANOVA with Equal Sample Sizes	$H_0: \mu_1 = \mu_2 = \mu_3 = \cdots = \mu_n$ H_1: At least one mean is different	$F = \frac{n s_{\bar{x}}^{\ 2}}{s_p^{\ 2}}$ Numerator $= k - 1$ Denominator $= k(n - 1)$

Prepared by: Suhaila Mohamad Yusuf
15th May 2019