**Unit 4 Exam Review – Important Formulas, Terminology & Calculator Commands**

Chapter 8: Confidence Intervals

*Interpretation of Confidence Level –*

*Interpretation of Confidence Interval –*

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|  | **Confidence Interval for Proportions** | **Confidence Intervals for Means** |
| **Conditions** |  |  |
| **Confidence Interval Formula** |  |  |
| **Choosing the Sample Size** |  |  |
| **Confidence Interval on the Calculator** |  |  |

Chapter 9: Significance Tests

*Type I error –*

*Type II error –*

*Power –*

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|  | **Significance Test for Proportions** | **Significance Tests for Means** |
| **Hypotheses** |  |  |
| **Conditions** |  |  |
| **Test Statistic** |  |  |
| **P-value** |  |  |
| **Significance Test Conclusion** |  |  |
| **Significance Test on the Calculator** |  |  |

**Unit 4 Exam Review – Important Formulas, Terminology & Calculator Commands**

Chapter 8: Confidence Intervals

*Interpretation of Confidence Level – “\_\_\_% of all possible samples of a given size from this population will result in an interval that captures the unknown parameter.”*

*Interpretation of Confidence Interval – “We are \_\_\_% confident that the interval from \_\_\_ to \_\_\_ captures the actual value of the population parameter.”*

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|  | **Confidence Interval for Proportions** | **Confidence Intervals for Means** |
| **Conditions** | **Random****Independent** – check 10% condition: $10n\leq N$**Normal** – check sample size conditions: $np\geq 10$ $n(1-p)\geq 10$ | **Random****Independent** – check 10% condition: $10n\leq N$**Normal** – check sample size conditions: $n\geq 30$If $n<30$, then you can assume the Normal distribution as long as $n\geq 15$ & the sample is approximately symmetric. |
| **Confidence Interval Formula** | $$statistic\pm \left(critical value\right)∙(standard deviation of statistic)$$$$\hat{p}\pm z^{\*}\sqrt{\frac{p(1-p)}{n}}$$ | $$statistic\pm \left(critical value\right)∙(standard deviation of statistic)$$$$\overbar{x}\pm t^{\*}\frac{s\_{\overbar{x}}}{\sqrt{n}}$$If $σ$ is unknownOR$$\overbar{x}\pm z^{\*}\frac{σ}{\sqrt{n}}$$If $σ$ is known |
| **Choosing the Sample Size** | $$z^{\*}\sqrt{\frac{p(1-p)}{n}}\leq margin of error$$Solve for *n.* | $$z^{\*}\frac{σ}{\sqrt{n}}\leq margin of error$$Solve for *n.* |
| **Confidence Interval on the Calculator** | To find $z^{\*}:$ 2nd Vars invNorm(lower tail probability)To find CI: Stat Tests 1-PropZIntx: # of successes, n: sample size, C-level: confidence levelCalculate | To find $t^{\*}:$ use the Table with degrees of freedom = n – 1To find CI: Stat Tests TInterval Stats$\overbar{x}$: sample mean, $s\_{x}:$ sample standard deviation, C-level: confidence levelCalculate |

Chapter 9: Significance Tests

*Type I error – Reject* $H\_{0}$ *when* $H\_{0}$ *is really true (Type I error =* $$ *).*

*Type II error – Fail to reject* $H\_{0}$ *when* $H\_{0}$ *is really false (Type II error =* $$ *).*

*Power – Correctly reject* $H\_{0}$ *when* $H\_{0}$ *is really false (Power = 1 – Type I error = 1 –* $$ *).*

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|  | **Significance Test for Proportions** | **Significance Tests for Means** |
| **Hypotheses** | $$H\_{0}:p=p\_{0}$$$H\_{a}:p>p\_{0}$ (one-sided test)$H\_{a}:p<p\_{0}$ (one-sided test)$H\_{a}:p\ne p\_{0}$ (two-sided test) | $$H\_{0}:μ=\\_\\_\\_\\_$$$H\_{a}:μ>\\_\\_\\_\\_$ (one-sided test)$H\_{a}:μ<\\_\\_\\_\\_$ (one-sided test)$H\_{a}:μ\ne \\_\\_\\_\\_$ (two-sided test) |
| **Conditions** | **Random****Independent** – check 10% condition: $10n\leq N$**Normal** – check sample size conditions: $np\_{0}\geq 10$ $n(1-p\_{0})\geq 10$ | **Random****Independent** – check 10% condition: $10n\leq N$**Normal** – check sample size conditions: $n\geq 30$If $n<30$, then you can assume the Normal distribution as long as $n\geq 15$ & the sample is approximately symmetric. |
| **Test Statistic** | $$z=\frac{\hat{p}-p\_{0}}{\sqrt{\frac{p\_{0}(1-p\_{0})}{n}}}$$Tells you how many standard deviations $\hat{p}$ is from the null hypothesis parameter $p\_{0}$. | $$t=\frac{\overbar{x}-μ}{\frac{s\_{x}}{\sqrt{n}}}$$Tells you how many standard deviations $\overbar{x}$ is from the null hypothesis parameter. |
| http://ebooks.bfwpub.com/tps4e/figures/9_UN5530001_big.gif**P-value** Area under curve = p-value | Total area under curve = p-value | Same as for proportions, but with appropriate hypotheses and test statistic t. |
| **Significance Test Conclusion** | If p-value is less than the prior stated level of significance, $α$, reject $H\_{0}$. If p-value is greater than or equal to the prior stated level of significance, $α$, fail to reject $H\_{0}$. NEVER accept $H\_{0}$. | If p-value is less than the prior stated level of significance, $α$, reject $H\_{0}$. If p-value is greater than or equal to the prior stated level of significance, $α$, fail to reject $H\_{0}$. NEVER accept $H\_{0}$. |
| **Significance Test on the Calculator** | To find the p-value: 2nd Vars normalcdf(lower bound =z-score, upper bound=100)To run the whole test: Stat Tests 1-PropZTest | To find the p-value: 2nd Vars tcdf(lower bound =t-score, upper bound=100)To run the whole test: Stat Tests T-Test |