Compiled by: Mr. Loren L. Spencer

Recipe for Success: 2-Sample Proportions Confidence Interval

1. **Define p_1 & p_2 in context** *(the population proportions)*
   p_1 = the population **proportion** for the 1st proportion
   P_2 = the population **proportion** for the 2nd proportion

2. **Write the Conditions** *(must be for both sets of data)*
   - **Independent Random Samples**
   - **$n\hat{p} \geq 10$**
   - **$n\hat{q} \geq 10$**
   - **n is less than 10% of the population $\frac{n}{.1}$**

3. **Write the Equation**

$$\hat{p}_1 - \hat{p}_2 \pm z^* \sqrt{\frac{\hat{p}_1\hat{q}_1}{n_1} + \frac{\hat{p}_2\hat{q}_2}{n_2}}$$

4. **List the Values**
   z = the number of standard deviations a value is from the center
   n_1 = the size of the sample of the 1st proportion
   x_1 = the number of outcomes of interest of the 1st proportion
   $\hat{p}_1 = \frac{x_1}{n_1}$ 1st sample proportion of interest
   n_2 = the size of the sample of the 2nd proportion
   x_2 = the number of outcomes of interest of the 2nd proportion
   $\hat{p}_2 = \frac{x_2}{n_2}$ 2nd sample proportion of interest

5. **Calculate z***
   - 2nd Vars
   - Inverse Norm
   - Area = $\frac{(1-Confidence\ level)}{2}$
   - μ = 0 and σ = 1

6. **Plug in the values**

7. **Calculate the Interval**
   - Stat Tests
   - **2-PropZInt**
   - x_1 comes from the problem or the data
   - n_1 comes from the problem or the data
   - x_2 comes from the problem or the data
   - n_2 comes from the problem or the data
   - **C-Level** Confidence level comes from the problem

8. **Write the interval**

9. **Write the Conclusion**

We are _______% confident that the true population proportion difference between

________________________ **and** ________________________ **lies within the interval** ___________.

Restate the definition of the p_1 | *Restate the definition of the p_2*

10. **Determining significance.**
    - **If 0 is in the interval**—There is **No** significant difference
    - **If 0 is not in the interval**-There **Is** a significant difference

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Recipe for Success: 2-Sample Proportions Hypothesis Test

1. **Write your Hypothesis**
   - Null H_0: $p_1 = p_2$
   - Alternative H_A: $p_1 \neq$ or < or > p_2
2. **Define p_1 & p_2 in context**
   - p_1 = the population **proportion** for the 1st proportion
   - P_2 = the population **proportion** for the 2nd proportion
3. **Write the Conditions** *(must be for both sets of data)*
   - **Independent Random Samples**
   - **n is less than 10% of the population $\frac{n}{.1}$**
   - **$n\hat{p} \geq 10$**
   - **$n\hat{q} \geq 10$**
4. **Write the Equations**

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\frac{(\hat{p}_c)(\hat{q}_c)}{n_1} + \frac{(\hat{p}_c)(\hat{q}_c)}{n_2}}}$$

$$\hat{p}_c = \frac{x_1 + x_2}{n_1 + n_2}$$

z = the number of standard deviations a value is from the center
n_1 = the size of the sample of the 1st proportion
x_1 = the number of outcomes of interest of the 1st proportion
$\hat{p}_1 = \frac{x_1}{n_1}$ 1st sample proportion of interest
n_2 = the size of the sample of the 2nd proportion
x_2 = the number of outcomes of interest of the 2nd proportion
$\hat{p}_2 = \frac{x_2}{n_2}$ 2nd sample proportion of interest
$\hat{p}_c$ = the 2 combined or pooled proportion successes
$\hat{q}_c = 1 - \hat{p}_c$ the 2 combined or pooled proportion successes

5. **List & Label all of input values**
   Calculate $\hat{p}_1$ & $\hat{p}_2$ & $\hat{p}_c$ & $\hat{q}_c$
6. **Plug values into the equation**
7. **Calculate the z and the p-value**
   - Stat Tests
   - 2-proportion z-test
   - **x_1** & **x_2** comes from the problem or the data
   - **n_1** & **n_2** comes from the problem or the data
   - Choose ≠ or < or >
8. **State the Decision**
   - The p-value is____
   - If the p-value is less than alpha, Reject the Null
   - If the p-value is greater than alpha, Fail to reject the Null
9. **Write The Conclusion**

Reject the Null: Our p-value is ____. We reject the Null. There is sufficient evidence alpha = ______ to suggest that the true population proportion ___________________________ is
*Restate the definition of the **p_1***
_____________________ true population proportion ____________________________.
Restate H_A ≠ or < or > *Restate the definition of the **p_2***

Fail to Reject the Null: Our p-value is ____. We Fail to reject the Null. There is not sufficient evidence at alpha = ______ to suggest that the true population proportion for
____________________________is ____________________ than the true population proportion for
*Restate the definition of the **p_1*** *Restate H_A ≠ or < or >*

____________________________.
*Restate the definition of the **p_2***