Compiled by: Mr. Loren L. Spencer

Recipe for Success: 2 Sample T-Confidence Intervals

1. **Define μ_1 & μ_2** *in context*
2. **Write the Conditions**

    1. **Both samples are random**
    2. **n < 10% of the population**
    3. **Populations are independent**
    4. **Normal Population or *n* > 30**

    If data is given, draw a boxplot or histogram-to show normality

3. **Write the formula for the Test**

$$\bar{x}_1 - \bar{x}_2 \ \pm\ t^* \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

$\bar{x}_1$ **&** $\bar{x}_2$ = the means of the samples
s_1 & s_2 = the standard deviation of the sample
n_1 & n_2 = the size of the sample

4. **Graph and Shade**
5. **Enter the Data if Given**
    - Stat Edit
    - Enter Data in columns L_1 & L_2
    - 2nd Quit
    - Stat Calc
    - 1-Var Stats L_1: $\bar{x}_1$, s_1, n_1 and L_2: $\bar{x}_2$, s_2, n_2

6. **List & Label all of input values** $\bar{x}_1$, s_1, n_1, $\bar{x}_2$, s_2, n_2, **df**

    df (comes from the calculator)
    - Stat Tests
    - 0:2-Samp T Int
    - Highlight **Data** if data is used otherwise highlight **STATS**
    - **s_1 & s_2** comes from the problem or the data
    - $\bar{x}_1$ **&** $\bar{x}_2$ comes from the problem or the data
    - **n_1 & n_2** comes from the problem or the data
    - **pooled** highlight no

7. **Calculate *t****
    - 2nd Vars
    - Inverse t
    - Area = $\frac{(1-Confidence\ level)}{2}$
    - **df** (comes from the calculator in the step above)

8. **Plug in the values**
9. **Write the interval**
10. **Write the Conclusion**

We are _______% confident that the true population mean difference for____________________
Restate the definition of the $\boldsymbol{\mu_1}$

and ___________________________ lies within the interval ________________
Restate the definition of the $\boldsymbol{\mu_2}$

11. **Explain the meaning of the confidence level**-*if asked*

In repeated sampling we expect this method to capture the true population mean difference

for ________________________ and _____________________________ ______% of the time
Restate the definition of the $\boldsymbol{\mu_1}$ *Restate the definition of the* $\boldsymbol{\mu_2}$

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Recipe for Success: 2-Sample T Hypothesis Test (difference of Means)

1. **Write the Hypothesis**
   - Null H_0: $\mu_1 = \mu_2$
   - Alternative H_A: $\mu_1 \neq \mu_2$ or $\mu_1 < \mu_2$ or $\mu_1 > \mu_2$
2. **Define μ_1 & μ_2** *in context*
3. **Write the Conditions**
   1. **Both samples are random**
   2. **n < 10% of the population**
   3. **Populations are independent**
   4. **Normal Population or *n > 30***

   If data is given, draw a boxplot or histogram-to show normality
4. **Write the Equation**

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

   t = the number of standard deviations from the mean
   μ_1 & μ_2 = the means of the population (may be assumed)
   $\bar{x}_1$ & $\bar{x}_2$ = the means of the samples
   s_1 & s_2 = the standard deviation of the sample
   n_1 & n_2 = the size of the sample
5. **Enter Data** (if given)
   - Stat Edit
   - Enter Data in columns L_1 & L_2
   - 2nd Quit
   - Stat Calc
   - 1-Var Stats L_1: $\bar{x}_1$, s_1, n_1 and L_2: $\bar{x}_2$, s_2, n_2
6. **List & Label all of input values** $\bar{x}_1$, s_1, n_1, $\bar{x}_2$, s_2, n_2

   df (comes from the calculator)
   - Stat Tests
   - **4**: 2-SampTTest Enter
   - Highlight **Data** if data is used otherwise highlight **STATS**
   - **s_1 & s_2** comes from the problem or the data
   - **$\bar{x}_1$ & $\bar{x}_2$** comes from the problem or the data
   - **n_1 & n_2** comes from the problem or the data
   - **pooled** highlight no
   - ***Choose* ≠ or < or >** (look for key words)
7. **Plug values into the equation**
8. **Write the t and the p-value**

   The T and the p-value are calculated in step 5
9. **State the Decision**
   - The p-value is____
   - compare to alpha: p-value (< or >) **alpha**
   - If the p-value is **less** than alpha, **Reject the Null**
   - If the p-value is **greater** than alpha, **Fail to reject the Null**
10. **Write the Conclusion**

Reject the Null: Our p-value is ____. We reject the Null. There is sufficient evidence at alpha = ___ to suggest that the difference in the true population mean for ______________________________ is ____________________________________

Restate the definition of the 1st mean — *Restate H_A ≠ or < or > 2nd mean definition*

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 difference in true population mean for ____________________________________ is ____________________________________

Restate the definition of the 1st mean — *Restate H_A ≠ or < or > 2nd mean definition*