Compiled by: Mr. Loren L. Spencer

Recipe for Success: Confidence Interval for a Paired T-test

1. **Define parameter μ_d *in context***

2. **Write the Conditions**
   1. **Random Sample**
   2. **n < 10% of the population**
   3. **Differences are independent**
   4. **The differences are Normal or *n > 30***

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

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

   $\bar{x}_d \pm t^* \frac{s_d}{\sqrt{n}}$

   t* = the number of standard deviations a value is from the mean & is based on the Confidence Level
   μ_d = 0
   $\bar{x}_d$ = the mean of the sample differences
   s_d = the standard deviation of the sample differences
   n = the number of sample differences

4. **Enter the Data if Given**
   - **Stat Edit**
   - **Enter Data** in columns **L_1 & L_2**

5. **Find $\bar{x}_d$**
   - **Stat Edit**
   - At the top of **L_3** type **2nd L_1 - 2nd L_2**

6. **Identify & label all inputs.**
   - s_d come from the problem or the data
   - $\bar{x}_d$ comes from the problem or the data
   - **n** comes from the problem or the data
   - **df= n-1** *(df is the degrees of freedom)*

7. **Calculate *t***
   - 2nd Vars
   - Inverse t
   - Area = $\frac{(1 - Confidence\ level)}{2}$
   - **df** = n-1

8. **Plug in and calculate the Confidence Interval**
   - **STAT**
   - **TESTS**
   - 8: **T Interval**

9. **Write the Interval**

10. **Write the Conclusion**

    We are _______% confident that the true population mean difference for

    ___________________________________ lies within the interval ______________.
    Restate the definition of the mean differences

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 __________________________________ _______% of the time
    Restate the definition of the mean differences

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Recipe for Success: Hypothesis Test for a Paired T-test

1. **Write your Hypothesis**
   - Null H_0: $\mu_d = 0$
   - Alternative H_A: μ_d ≠ or < or > 0
2. **Define parameter μ_d *in context* & write the conditions**
   1. **Random Sample**
   2. **n < 10% of the population**
   3. **Differences are independent**
   4. **The differences are Normal or *n* > 30**

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

$$t = \frac{\bar{x}_d - \mu_d}{\frac{s_d}{\sqrt{n}}}$$

t = the number of standard deviations a value is from the mean
$\mu_d = 0$
$\bar{x}_d$ = the mean of the sample differences
s_d = the standard deviation of the sample differences
n = the number of sample differences

4. **Enter Data** (if given)
   - **Stat Edit**
   - **Enter Data** in columns L_1 & L_2
5. **Find $\bar{x}_d$**
   - At the top of L_3 type 2^{nd} L_1 - 2^{nd} L_2
6. **List & Label all of input values**
   n, $\bar{x}_d$, s_d
   μ_d = 0 & df= n-1
   - **Stat Calc**
   - **1-Var Stats** press **Enter**
   - **List** type 2^{nd} L_3
7. **Plug values into the equation**
8. **Calculate the t and the p-value**
   μ_d = 0
   df= n-1
   - Stat Tests
   - **2:**T-Test Enter
   - Highlight **Data** if data is used otherwise highlight **STATS**
   - s_d come from the problem or the data
   - $\bar{x}_d$ comes from the problem or the data
   - **n** comes from the problem or the data
   - Choose ≠ or < or > (look for key words)
9. **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
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 true population mean differences for ____________________________________is ____________________________________

Restate the definition of the mean differences — *Restate H_A ≠ or < or > mean differences*

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 mean difference for ____________________________________is ____________________________________

Restate the definition of the mean difference — *Restate H_A ≠ or < or > mean difference*