Dependent Samples:

Matched Pairs & TI

Tips & Notations:

- 1. Key Words: Before & After.
- 2. Preparation:
 - (a) Enter data from before group in L_1 .
 - (b) Enter matched data from after group in L_2 .
 - (c) Highlight L_3 and then do $L_1 L_2$ followed by ENTER.
- 3. Mean of the differenced data: d
- 4. Standard Deviation of the differenced data: S_d
- 5. Population mean difference of the matched-pairs data: μ_d

Basic Statistics Computations For $\overline{d} \& s_d$:

1. How to Find \overline{d} : STAT > CALC > 1-Var STATS > L_3 > ENTER, $\overline{d} = \overline{x}$ 2. How to Find s_d : STAT > CALC > 1-Var STATS > L_3 > ENTER, $s_d = s_x$

Confidence Interval For μ_d :

1. How to Write the Final Answer:

 $< \mu_d <$

2. Confidence Interval Using TI:

TInterval > Inpt: Data, List: L_3 , and Freq:1.

Hypothesis Testing For μ_d :

 $H_0: \mu_d = 0$ $H_1: \begin{cases} \mu_d \neq 0 \quad \text{Two - Tail Test} \\ \mu_d > 0 \quad \text{Right - Tail Test} \\ \mu_d < 0 \quad \text{Left - Tail Test} \end{cases}$

1. Finding Critical Values Using TI:

- 2. Degrees Of Freedom:
- 3. Finding C.T.S. & P-Value Using TI:

PRGM > TVAL > ENTER (Twice)

$$df = n - 1$$

STAT > TESTS > TTest

Guided Example:

10 different athletes were randomly selected to join a 3–month diet program to gain weight. The results are given in the following table.

Before Diet:	185	170	190	200	180	195	175	200	215	220
After Diet:	200	180	190	195	195	180	200	225	220	215

After entering these data in L_1 and L_2 , followed by the difference in L_3 , we should have the following:

Before Diet —> L_1	185	170	190	200	180	195	175	200	215	220
After Diet —> L_2	200	180	190	195	195	180	200	225	220	215
Difference —> L_3	-15	-10	0	5	-15	15	-25	-25	-5	5

- 1. Using L_3 , find \bar{d} . Round to the nearest whole number. Answer: $\bar{d} = -7$
- 2. Using L_3 , find S_d . Round to the nearest whole number. Answer: $S_d = 13$
- Using these results, find the 98% confidence interval for the mean of all differences μ_d. Round to the one decimal place value.
 Answer: -18.6 < μ_d < 4.6
- 4. test the claim at $\alpha = .01$ that this diet plan is effective to help athletes to gain weight. Answer:

 $\begin{aligned} H_0: \mu_d &\geq 0 \\ H_1: \mu_d &< 0, \, \text{LTT, Claim} \end{aligned}$

- 5. Using TVAL and T-Test , find C.V., C.T.S., and P-value. Answer: C.V.=-2.821, C.T.S.=-1.703, and p-value=.061
- 6. Conclusion: C.T.S. is in NCR. P–Value > α . H_0 is valid. H_1 is invalid. Reject the claim.
- 7. Suggest a couple of values for α that reverses the conclusion. Answer: Pick any value such that p-value $\leq \alpha$ such as $\alpha = 0.08$, or $\alpha = 0.1$.