

## Using Minitab to run a Dependent Difference Test

For this test, you need two lists of quantitative data having the same length.

1. Put one list under C1 and the other list under C2.
2. Click on "Stat", choose "Basic Statistics" and then "Paired t ...".
3. Make sure "Each sample is in a column" is selected in the drop-down box.
4. Enter C1 next to "Sample 1" and C2 next to "Sample 2".
5. Click on the "Options" button.
6. Click on the box next to "Perform hypothesis test".
7. Enter the percent confidence desired next to "Confidence level".
8. Enter the difference that appears in your hypotheses next to "Hypothesized difference".
9. Choose the correct alternative hypothesis from the drop down box next to "Alternative hypothesis".
10. Click on "OK" in that window and click on "OK" in the next window.

The result will appear in the "Session" window under the heading "Pair T-test and CI". The test statistic will appear next to "T-Value" and the P-value will appear next to "P-value".

**Example** (Navidi & Monk, *Elementary Statistics*, 2<sup>nd</sup> edition, #11 p.539): The data is shown in the table below. The significance is 0.05.  $1 - 0.05 = 0.95$ , so the confidence is 95%.

Block	1	2	3	4	5
After 3 days	1341	1316	1352	1355	1327
After 6 days	1376	1373	1366	1384	1358

Open Minitab. Enter the "After 3 days" data under C1, and the "After 6 days" data under C2. The result should look like the following.

↓	C1	C2	C3
	3 Days	6 Days	
1	1341	1376	
2	1316	1373	
3	1352	1366	
4	1355	1384	
5	1327	1358	

Now click on "Stat" and then choose "Basic Statistics" and "Paired t ...". Make sure "each sample in a column" is selected from the drop down box in the upper right corner of the window. Enter C1 in the box next to "Sample 1", and enter C2 in the box next to "Sample 2".

Click on the "Options ..." button. Enter 95 next to "Confidence level". Since we are testing whether or not the means are different, we enter 0 next to "Hypothesized difference:". Then choose "Difference  $\neq$  hypothesized difference" from the drop down box next to "Alternative hypothesis:".

Click on "OK" in that window and click on "OK" in the window below. The test results will appear in the "Session" window under the heading "Paired T-Test and CI: ... ". The test statistic is given next to "T-value" as -4.79. The P-value is given next to "P-value" as 0.009.

Since the P-value of 0.009 is less than the significance of 0.05, the null hypothesis is rejected. With 95% confidence, the evidence is strong enough to say that the mean after 3 days and the mean after 6 days are different.