Dependent Difference Tests Using Excel

Example #11 p.539 The significance is 0.05. The alternative hypothesis is that the means are not equal. The data shown below represents compressive strength of blocks of concrete in kilopascals after 3 days and after 6 days.

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

Open an Excel spreadsheet. Enter the data for 3 days in column A. Enter the data for 6 days in column B.

Enter the formulas shown in cells D2 through D6 in the neighboring cells, C2 through C6. Once you have entered the formula in C2, you can just copy it to cells C3 through C6, and the cell numbers will change to the correct values, automatically. When you have finished typing in the formulas, you will only see the values shown below in cells C2 through C6 that Excel calculates.

The formulas in F3, F4 and F5 are all computed using the numbers in C2 through C6, indicated by "C2:C6".

There are three things to point out for the formula in F10. A2:A6 and B2:B6 are the lists of numbers in columns A and B. The "2" indicates this is a two-tailed test. The "1" at the end of the formula indicates the type of test to be performed. "1" is the code for a dependent difference test, which Excel calls a paired t-test.

	A	B	C	D		E	F
1	**3 days**	**6 days**	**Diff.**				
2	1341	1376	-35	=(A2-B2)	Signif. =	0.05	
3	1316	1373	-57	=(A3-B3)			
4	1352	1366	-14	=(A4-B4)	Mean =	-33.2	= AVERAGE(C2:C6)
5	1355	1384	-29	=(A5-B5)	Std. Dev. =	15.498	= STDEV.S(C2:C6)
6	1327	1358	-31	=(A6-B6)	Size =	5	= COUNT(C2:C6)
7					Conf. =	95	=(1–B2)*100
8					Std. Error =	6.931	=E4/SQRT(E5)
9					Test Stat. =	-4.790	=(E3-0)/E9
10					P-value =	0.0087	=T.TEST(A2:A6,B2:B6,2,1)
11							

The most important values here are the test statistic, -4.790, and the P-value, 0.0087. Since the P-value, 0.0087, is less than the significance, 0.05, the null hypothesis is rejected. Thus, the conclusion would be that, with 95% confidence, the evidence is strong enough to say the means for 3 days and 6 days are different.