Paired t-test

This should be used to compare the location of two populations when paired samples are available and when it is reasonable to assume that the differences (di) between the paired samples are independent and that the distribution of the differences (D) be at least approximately normal. For n paired samples, the test is based on the t-distribution with (n-1) degrees of freedom. The calculated t value is given, which may be + or -. The hypotheses are: Ho is $\mu D = 0$, and H_1 is $\mu D \neq 0$ (two-sided alternative) or

$\mu D < 0$ or $\mu D > 0$ (one-sided H1 alternatives), where μD refers to the mean of the differences.

The test makes use of the result that, when Ho is true, the distribution of D is N(0,sd^2/n) where n is the number of differences (including zero differences), sd^2 is the population standard deviation squared, and N( ) means the normal distribution given by the parameters enclosed in the brackets. The t-distribution is needed when the sd^2 is unknown and needs to be estimated by the data in the given sample.

Method: The differences between the paired observations are taken and used to obtain values of d and sd^2, the sample mean and sample variance of the differences. The t statistic is then calculated using the formula, D/(sd/√n), and compared with the t-distribution with (n-1) degrees of freedom. The p-value for a one-sided alternative is calculated for you. If your problem requires a two-sided alternative then you will need to double the given p-value. Tables of the t-distribution are also provided under the Static Tables menu.

See the Statistics topic for instructions on selecting this test.