Fact Sheet – Paired Difference Test (11.2)

This test is used to compare the difference between paired data. There must be a one-to-one relationship between one value in the first sample and one value in the second sample.
n represents the number of pairs in the sample.

Example: Student scores improve from the "by hand" version of an exam to the "StatCrunch" version of the exam.

Conditions

To test hypotheses regarding paired quantitative data, the following two conditions must be met.

- The differences between the paired data come from a population that is normally distributed (QQ Plot, Correlation Coefficient at least 0.9) and has no outliers (Boxplot)
  OR
  the sample size is at least 30 $(n \geq 30)$
- $20n \leq N$

Hypothesis Test

Step 1

You must identify which direction you will be subtracting: *d* = A – B.
The null hypothesis will be $\mu_d = 0$. H_1 will be either $\mu_d < 0$, $\mu_d > 0$, or $\mu_d \neq 0$.

Step 3

The test statistic is $t = \dfrac{\overline{d}}{\left(s_d / \sqrt{n} \right)}$.

Just write "Paired Difference Test", rather than writing the test statistic.

Step 4

To compute the test statistic and P-value using StatCrunch …

Enter the data in two columns.
Stat > T Statistics > Paired
Select the correct column for each sample. Select the "Save Differences" box. Click Next.
Leave the value for null: mean diff. as 0. Select the appropriate sign for H1. Click Calculate.

Once you have calculated the test statistic and *P*-value, you must construct the QQ plot & boxplot for the "Differences" column.