

**Sign Test for Population Median**

The Sign test can only be used to compare the median of a population to a given value. It cannot be used to test the mean of a population. To test the mean of a population, a different test, such as the t-test, would be more appropriate. The Sign test is a non-parametric statistical test, which means that it makes no assumptions about the underlying distribution of the data. Because of this, it is often used when the data are not normally distributed or when the sample size is small. In contrast, the t-test assumes that the data are normally distributed, which allows it to make more powerful statistical inferences.

***Why the Median only?***

- The median is a measure of central tendency that is commonly used to summarize a set of data. It is the middle value of a set of data when the values are ordered from least to greatest. Unlike the mean, which is sensitive to extreme values in the data, the median is not affected by extreme values, or "outliers." This makes it a more robust measure of central tendency than the mean.

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**Wilcoxon Signed-Rank Test Vs. Paired Sample Sign Test**

The Paired Sample Sign Test and the Wilcoxon Paired Test are both non-parametric statistical tests that are used to compare the difference between two paired samples or repeated measurements on the same individuals. These tests are often used when the data are not normally distributed or when the sample size is small.

The Paired Sample Sign Test is a relatively simple and easy-to-understand test that is based on the concept of "significance" in the difference between the two paired samples. In this test, the differences between the pairs are calculated, and then the number of positive and negative differences are counted. If the number of positive differences is significantly different from the number of negative differences, then this suggests that there is a significant difference between the two paired samples.

The Wilcoxon Paired Test, also known as the Wilcoxon signed-rank test, is a more powerful and flexible test that can be used to compare the difference between two paired samples. In this test, the differences between the pairs are ranked, and then the sum of the ranks for the positive and negative differences are calculated. If the sum of the ranks for the positive differences is significantly different from the sum of the ranks for the negative differences, then this suggests that there is a significant difference between the two paired samples.

In summary, the Paired Sample Sign Test and the Wilcoxon Paired Test are both non-parametric statistical tests that can be used to compare the difference between two paired samples. The Paired Sample Sign Test is a simple and easy-to-understand test, while the Wilcoxon Paired Test is a more powerful and flexible test.

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**Wilcoxon Rank Sum Test**

The Wilcoxon rank sum test, also known as the Mann-Whitney U test, is a non-parametric statistical test used to compare the difference between two independent samples. This test is used when the data are not normally distributed or when the sample sizes are small.

The Wilcoxon rank sum test is based on the concept of ranking the values in each sample, and then comparing the sum of the ranks for the values in each sample. If the sum of the ranks for one sample is significantly different from the sum of the ranks for the other sample, then this suggests that there is a significant difference between the two samples.

The Wilcoxon rank sum test is often used in the same situations as the t-test, which is a parametric test that assumes that the data are normally distributed. However, the Wilcoxon rank sum test is less sensitive to violations of this assumption, making it a more robust test in certain situations.