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# Comparing and contrasting ANOVA and T-test.

## T-test

The t-test is described as the statistical test that examines whether the population means of two samples greatly differ from one another, using t-distribution which is used when the standard deviation is not known, and the sample size is small. It is a tool to analyse whether the two samples are drawn from the same population.

In t-test null hypothesis takes the form of H0: µ(x) = µ(y) against alternative hypothesis H1: µ(x) ≠ µ(y), wherein µ(x) and µ(y) represents the population means. The degree of freedom of t-test is n1 + n2 – 2

## ANOVA

Analysis of Variance (ANOVA) is a statistical method, commonly used in all those situations where a comparison is to be made between more than two population means like the yield of the crop from multiple seed varieties. It is a vital tool of analysis for the researcher that enables him to conduct test simultaneously. When we use ANOVA, it is assumed that the sample is drawn from the normally distributed population and the population variance is equal.

With the use of this technique, we test, null hypothesis (H0) wherein all population means are the same, or alternative hypothesis (H1) wherein at least one population mean is different.

Similarities between ANOVA and T-test

Both use statistical methods of testing a hypothesis. And they both share the assumptions:

* Sample drawn from the population is normally distributed
* Homogeneous variance
* Random data sampling
* Observations are independent
* Dependent variable is measured in ratio or interval levels

## Differences between ANOVA and T-test

|  |  |  |
| --- | --- | --- |
| Comparison variable | T-TEST | ANOVA |
| Definition | t-test is statistical hypothesis test used to compare the means of two population groups. | ANOVA is an observable technique used to compare the means of more than two population groups. |
| Distribution | Student distribution | F and Student distribution |
| Utilization | t-tests are used for pure hypothesis testing purposes. | ANOVA is used to examine standard deviations |
| Feature | t-test compares two sample sizes (n) both below 30. | ANOVA equates three or more such groups. |
| Error | t-test is less likely to commit an error. | ANOVA has more error risks. |
| Formulas | [t-test](https://keydifferences.com/wp-content/uploads/2016/05/t-test.jpg) | [ANOVA](https://keydifferences.com/wp-content/uploads/2016/05/ANOVA.jpg) |
| Test | t-test can be performed in a double-sided or single-sided test. | ANOVA is one-sided test due to no negative variance. |
| Population | t-test is used when the population is less than 30. | ANOVA is used for huge population counts. |

## Conclusion

After reviewing the above points, it can be said that t-test is a special type of ANOVA that can be used when we have only two populations to compare their means. Although the chances of errors might increase if t-test is used when we have to compare more than two means of the populations concurrently, that is why ANOVA is used.