

Stat Support Activity: Two-Population Degrees of Freedom and Critical Value T-scores

Notes:

- **Degrees of Freedom:** To calculate the critical value T-scores for a two-population confidence interval from independent groups, we must first find the degrees of freedom. The degrees of freedom calculation by hand is difficult. There are however many free, easy to use, online calculators for degrees of freedom. I like to use this one. You will need to enter the sample size and sample standard deviation for each of your two samples. Notice the degrees of freedom calculator gave 69.809. It is usually common to round down the degrees of freedom to account for possible greater variability. Computer programs will round this degree of freedom down to 69 even though it was closer to 70.
- <https://volweb.utk.edu/~ccwiek/TwoSampleDoF.html>
- **Rounding Down Degrees of Freedom:** Always round down to the next lowest whole number. This accounts for more potential error. So if degrees of freedom is 51.833 we would round it down to 51. (Notice not 52.)
- **Critical Value T-scores:** Once you have the degrees of freedom, you can go to www.lock5stat.com click on "T" under "Theoretical Distributions". Enter the degrees of freedom and click on "two-tails". Put in the confidence level in the middle upper box and push "OK".

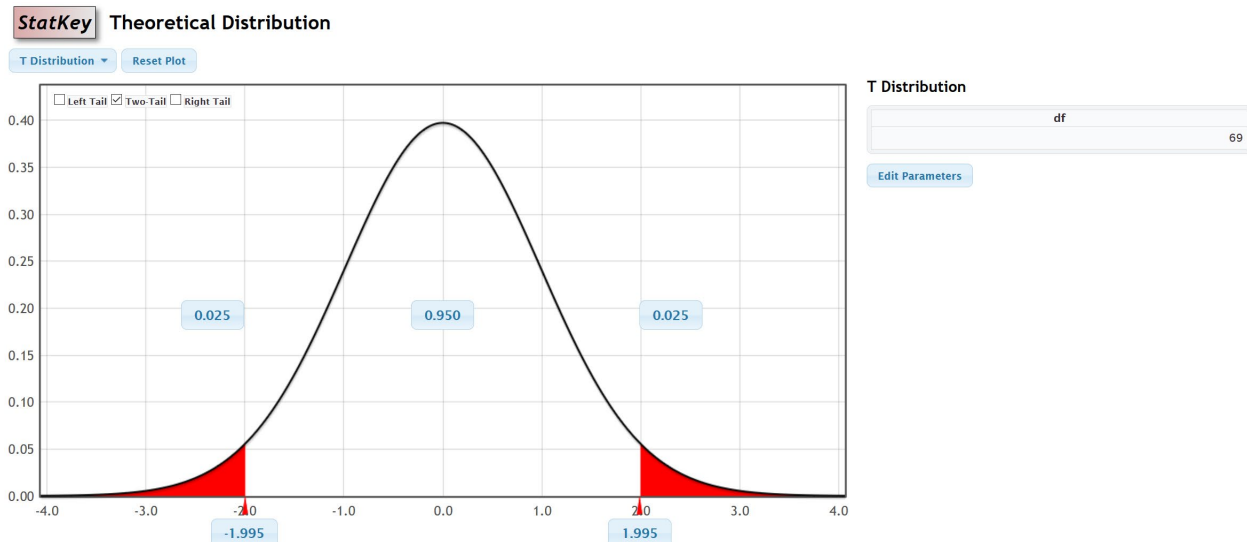
Example

Compute Degrees of Freedom for t-test comparing means of two independent samples

Enter in the sample sizes (n_1 , n_2) and sample standard deviations (s_1 , s_2) and click "Compute DF" to get the degrees of freedom describing the sampling distribution of the difference in sample means.

n_1 : n_2 : s_1 : s_2 : DF:

We can now look up the critical value T-scores for this confidence interval with the Theoretical Distribution T-score calculator in StatKey. Notice the critical value T-scores for 69 degrees of freedom are ± 1.995 .



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Problems:

Directions: Go to the degrees of freedom calculator at <https://volweb.utk.edu/~ccwiek/TwoSampleDoF.html> . Use the following sample sizes and sample standard deviations to look up the degrees of freedom. Round the degrees of freedom down to the ones place. Then go to www.lock5stat.com. Under the “theoretical distributions” menu, click on “T”. Put in the rounded down degrees of freedom and push “OK”. Click “Two-Tail”. If needed, change the middle upper box to the confidence level (0.95, 0.90, 0.99) and then push ok.

1.

95% Confidence Level

Sample 1: $n_1 = 90$, $s_1 = 5.8$

Sample 2: $n_2 = 85$, $s_2 = 11.4$

- Degrees of Freedom (exact answer) =
- Degrees of Freedom (rounded down to one's place) =
- Critical Value T-score for 95% confidence: $T_C =$

2.

90% Confidence Level

Sample 1: $n_1 = 30$, $s_1 = 23.956$

Sample 2: $n_2 = 45$, $s_2 = 17.841$

- Degrees of Freedom (exact answer) =
- Degrees of Freedom (rounded down to one's place) =
- Critical Value T-score for 90% confidence: $T_C =$

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3.

99% Confidence Level

Sample 1: $n_1 = 64$, $s_1 = 128.4$

Sample 2: $n_2 = 53$, $s_2 = 107.2$

- a) Degrees of Freedom (exact answer) =
- b) Degrees of Freedom (rounded down to one's place) =
- c) Critical Value T-score for 99% confidence: $T_C =$