

How to Perform a One-Way ANOVA on Your TI-84 Calculator: A Step-by-Step Guide

Authored by
stats writer

March 11, 2026

RECOMMENDED CITATION

stats writer (2026). *How to Perform a One-Way ANOVA on Your TI-84 Calculator: A Step-by-Step Guide*. PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=135215>

The **One-Way ANOVA**, an abbreviation for "Analysis of Variance," is a robust **statistical hypothesis testing** framework employed to determine if there are any **statistically significant** differences between the **means** of three or more **independent groups**. When researchers encounter datasets involving multiple categories, performing individual t-tests between every pair of groups increases the risk of a Type I error. The **One-Way ANOVA** solves this by providing an omnibus test that evaluates all groups simultaneously. Utilizing a **TI-84 Calculator** allows students and researchers to execute these complex calculations with precision, bypassing the need for arduous manual computation of the **variance** and sum of squares.

Perform a One-Way ANOVA on a TI-84 Calculator

Theoretical Foundations of the One-Way ANOVA

Before diving into the technical execution on the TI-84 Calculator, it is essential to understand the underlying logic of the One-Way ANOVA. At its core, the test compares the variance within each group to the variance between the group means. If the variance between the groups is significantly higher than the variance within the groups, the test concludes that the group means are not all equal. This relationship is quantified by the F-statistic, which serves as the primary diagnostic value for the test.

The null hypothesis for a One-Way ANOVA posits that all population means are identical, suggesting that any observed differences in the sample data are merely due to probability or sampling error. Conversely, the alternative hypothesis suggests that at least one group

mean is significantly different from the others. It is important to note that the **One-Way ANOVA** does not specify which particular group is different; it only indicates that a difference exists somewhere within the set of groups being compared.

Executing this test requires a clear understanding of your data structure. The "one-way" aspect refers to the fact that there is a single **independent variable**, often called a factor, which has multiple levels or categories. For example, if you are testing the impact of different fertilizers on plant growth, the fertilizer type is your single factor, while the specific brands represent the levels. The **mean** growth of plants for each brand would then be compared using the **TI-84 Calculator**.

To ensure the validity of your results, several assumptions must be met. These include the **normal distribution** of the residuals, **homogeneity of variance** (also known as homoscedasticity), and the independence of observations. If these assumptions are severely violated, the **p-value** generated by the **TI-84 Calculator** may lead to incorrect conclusions regarding the **statistical significance** of your findings.

Core Assumptions and Data Requirements

When preparing to perform an analysis on the TI-84 Calculator, one must first verify that the data is appropriate for a One-Way ANOVA. The primary requirement is that the dependent variable must be continuous, meaning it is measured on an interval or ratio scale. This allows for the calculation of means and standard deviations, which are the fundamental building blocks of the F-statistic calculation.

The assumption of independent groups is paramount. This means that the subjects in one group should have no relationship to the subjects in another group. For instance, you should not have the same individual participating in multiple groups, as this would require a Repeated Measures ANOVA rather than a One-Way ANOVA. Proper randomization during the experimental design phase is the most effective way to satisfy the independence assumption before you ever touch your TI-84 Calculator.

Furthermore, the data within each group should ideally follow a normal distribution. While the ANOVA is generally considered robust to minor deviations from

normality--especially with larger sample sizes--extreme skewness can distort the results. Similarly, the homogeneity of variance implies that the spread of data points should be roughly equal across all groups. You can check this on your TI-84 Calculator by looking at the standard deviation of each list; if one group's variance is significantly larger than another's, the test's reliability may be compromised.

Finally, the null hypothesis assumes that there is no effect of the grouping variable. By calculating the p-value, we are essentially determining the probability of observing our sample data if the null hypothesis were true. If this probability is very low (typically less than 0.05), we reject the null hypothesis in favor of the alternative hypothesis, concluding that a statistically significant difference exists.

A Practical Example: Evaluating Study Techniques

To illustrate the process, let us consider a practical research scenario. Suppose a researcher recruits 30 students to participate in a study regarding academic performance. These students are randomly assigned to one of three different studying techniques: flashcards,

group discussion, or silent reading. After one month of using their assigned technique to prepare for an exam, all 30 students take the same standardized test. The goal is to determine if the mean scores differ based on the study technique used.

In this example, the study technique is the independent variable (with three levels), and the exam score is the dependent variable. By performing a One-Way ANOVA on a TI-84 Calculator, we can efficiently analyze whether one technique is more effective than the others or if the variations in scores are simply due to random chance. This eliminates the bias of anecdotal evidence and provides a mathematically grounded conclusion.

The data for each of the three groups will be entered into the calculator's list editor. Each list (L1, L2, and L3) will represent one of the study techniques. Once the data is entered, we will use the internal functions of the TI-84 Calculator to generate the F-statistic and p-value. The following sections will guide you through the exact button sequences required to reach the final interpretation of these exam scores.

Step 1: Inputting Data into the TI-84 List Editor

The first technical step in performing the One-Way ANOVA is data entry. To begin, press the STAT button on your TI-84 Calculator. This will open the primary statistics menu. Ensure that the EDIT tab is highlighted and press Enter to access the list editor. This screen allows you to manage multiple columns of data, which are labeled L1, L2, L3, and so on.

In column L1, enter the exam scores for the students who utilized the first study technique. In L2, enter the scores for the second technique, and in L3, enter the scores for the third technique. It is vital to ensure that each data point is entered accurately, as a single typo can significantly alter the mean and variance of a group. If you have existing data in these lists, you can clear it by highlighting the list name at the top of the column and pressing Clear followed by Enter.

L1	L2	L3	L4	L5	1
85	91	79	-----	-----	
86	92	78			
88	93	88			
75	85	94			
78	87	92			
94	84	85			
98	82	83			
79	88	85			
71	95	82			
80	96	81			
-----	-----	-----			

Once all the scores for the 30 students are successfully inputted into their respective lists, take a moment to double-check the values against your original records. The TI-84 Calculator is a powerful tool, but its output is only as reliable as the data it processes. Once you are confident in your data entry, you are ready to navigate to the testing menu to perform the actual analysis.

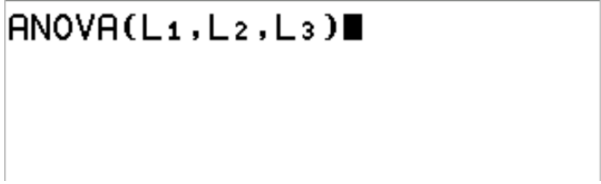
Step 2: Accessing and Executing the ANOVA Function

With your data safely stored in lists L1, L2, and L3, you can now proceed to the hypothesis testing phase. Press the STAT button again, but this time, use the right arrow key to navigate to the TESTS menu. This menu contains all the inferential statistics functions available on the TI-84 Calculator, including t-tests, z-tests, and chi-square tests.

Scroll down through the list until you find the option labeled ANOVA(. On many versions of the calculator, this is near the bottom of the list. Once highlighted, press Enter. This will bring the ANOVA command onto your home screen, where you must specify which lists contain the data you wish to compare.

```
EDIT CALC TESTS
0↑2-SampTInt...
A:1-PropZInt...
B:2-PropZInt...
C:χ²-Test...
D:χ²GOF-Test...
E:2-SampFTest...
F:LinRegTTest...
G:LinRegTInt...
H:ANOVA(
```

To complete the command, you must tell the TI-84 Calculator where your data is located. Type L1, L2, L3 followed by a closing parenthesis. To enter L1, press 2nd and then the 1 key. For L2, press 2nd and then the 2 key. For L3, press 2nd and then the 3 key. Ensure that each list is separated by a comma (the comma key is located directly above the 7 key).



```
ANOVA(L1, L2, L3)■
```

After your home screen displays ANOVA(L1, L2, L3), press the Enter button. The TI-84 Calculator will instantly process the variance calculations and present a results screen containing all the critical values needed to interpret the One-Way ANOVA.

Step 3: Deciphering the Results and Output Screen

The output screen on the TI-84 Calculator provides a wealth of information. The most crucial values are the F and the P. The F represents the F-statistic, which is the ratio of the variance between groups to the variance within groups. A higher F-value generally indicates a greater likelihood that the group means are different. However, the F-statistic must be interpreted in the context of the degrees of freedom.

The P value is the p-value associated with the F-statistic. This number tells you the probability of obtaining the current results if the null hypothesis were true. In most academic research, a p-value threshold

(alpha) is set at 0.05. If the P on your TI-84 Calculator is less than 0.05, you have statistically significant evidence to reject the null hypothesis.

```
One-way ANOVA
F=2.357532255
p=0.1138479535
Factor
df=2
SS=192.2
MS=96.1
```

Additionally, you will see values for "Factor" and "Error." The "Factor" section corresponds to the variation between the groups, while the "Error" section corresponds to the variation within the groups. Each section lists the degrees of freedom (df), the sum of squares (SS), and the mean squares (MS). These values are used to construct the ANOVA table often found in scientific publications and are essential for a complete report of your findings.

In our student study example, if the p-value displayed on the TI-84 Calculator is greater than 0.05, we conclude that we do not have sufficient evidence to say the study techniques lead to different exam scores. We fail to reject the null hypothesis, suggesting that any

differences in the means were likely due to random variation among the students rather than the effectiveness of the techniques themselves.

Advanced Considerations and Post-Hoc Analysis

It is important to remember that a One-Way ANOVA is only the first step if you find statistically significant results. If the p-value on your TI-84 Calculator had been less than 0.05, you would know that "at least one" group was different, but you would not know which one. In such cases, researchers must perform a post-hoc test, such as Tukey's test, to conduct pairwise comparisons and pinpoint the specific differences.

While the TI-84 Calculator is excellent for the primary ANOVA, some post-hoc tests may require more advanced statistical software or manual calculation using the MS (mean square) error and degrees of freedom provided by the calculator. Understanding this limitation is key to being a thorough researcher; the ANOVA tells you there is a story to tell, but the post-hoc test provides the specific details of that story.

In conclusion, the TI-84 Calculator remains a vital asset

for performing a One-Way ANOVA quickly and accurately. By following the structured steps of data entry, command execution, and careful result interpretation, you can transform raw data into meaningful scientific insights. Whether you are a student preparing for an exam or a researcher analyzing experimental data, mastering this tool will significantly enhance your analytical capabilities.

ARABPSYCHOLOGY.COM