

## Friedman Test

This test is similar to a oneway repeated measures ANOVA, however, the data on the dependent variable is measured on an ordinal scale. The test assumes the study involves one independent variable, and that the same participants are repeatedly observed under **three or more** conditions. Also, the present test bears some resemblance to the Wilcoxon matched pairs signed rank test. However, the Wilcoxon involves one independent variable with **two and only two levels** and the participants in the study are in both conditions. The present test also involves only one independent variable with the **same** participants in **three or more** conditions of the study, and a dependent variable measured on an ordinal scale.

Suppose for example we want to find out if students have a preference for one type of soda over others. They are blindfolded and given a taste test. They are asked to take a sip of Brand X, Brand Y and Brand Z sodas and to **rank order** their preference for the three sodas where a 1 is the highest rank, a 2 the next highest and a 3 the least preferred soda. The data representing the rankings given by each participant to the three sodas are:

### Participants' Rankings of the Three Brands of Soda

<u>Participant</u>	<u>Brand X</u>	<u>Brand Y</u>	<u>Brand Z</u>
Brooks	2	1	3
Dot	1	3	2
Ken	1	2	3
Pam	1	3	2
Gary	1	3	2
Laura	1	2	3
Ed	1	3	2
Cheryl	1	2	3
Dave	1	3	2
Ginny	2	1	3

1. Logon to system
2. **Click Start > Programs > SPSS for Windows > SPSS 10.1 for Windows.** At this point a window will appear asking you what you would like to do. Click on the circle next to Type in Data (2<sup>nd</sup> option in list) and then click **OK** at the bottom of the window.
3. A Data Editor will appear. Look in the lower left corner of the screen. You should see a **Data View** tab and to the right of it a **Variable View** tab. The **Variable View** tab will be used first for the Data **Definition** Phase of creating a data file. The **Data View** tab will be used to actually enter the raw numbers listed above. (See pages 1-3 for a more detailed explanation of creating data files.)

## DATA DEFINITION PHASE

4. Click on the **Variable View** tab in the lower left corner. A new screen will appear with the following words at the top of each column.  
**Name** Type Width Decimals **Label** **Values** Missing Columns Align Measure
5. Click on the white cell in **Row 1** under the word **Name** and type in the word **Brandx**
6. Click on the white cell in **Row 1** under the word **Label** and type in **Brand X Rank**. (Doing this will provide you with a more expansive label in the results output).
7. Click on the white cell in **Row 2** under the word **Name** and type in the word **Brandy**
8. Click on the white cell in **Row 2** under the word **Label** and type in **Brand Y Rank**. (Doing this will provide you with a more expansive label in the results output).
9. Click on the white cell in **Row 3** under the word **Name** and type in the word **Brandz**

10. Click on the white cell in **Row 3** under the word **Label** and type in **Brand Z Rank**. (Doing this will provide you with a more expansive label in the results output).

## DATA ENTRY PHASE

11. Click on the **Data View** tab in the lower left corner. The data **view** screen will now appear with Column 1 named **Brandx**, Column 2 named **Brandy** and Column 3 named **Brandz**.
12. Enter the data for each of the 10 participants as follows. Mouse to the top cell under the first column which is Brandx and enter the following:

2 tab 1 tab 3  
 1 tab 3 tab 2  
 1 tab 2 tab 3  
 1 tab 3 tab 2  
 1 tab 3 tab 2  
 1 tab 2 tab 3  
 1 tab 3 tab 2  
 1 tab 2 tab 3  
 1 tab 3 tab 2  
 2 tab 1 tab 3

The data may also be entered down one column at a time by entering all of the Brand X rankings first, then mousing to the second column and entering all of the Brand Y rankings, and then mousing to the third column and entering all of the Brand Z

## Data Analysis

1. Click on **Analyze** at top of screen then
  - a. Click on **Non-Parametric** Tests then
  - b. Click on **K Related Samples**
2. Highlight **Brandx** by clicking on it then
  - a. Click on **arrow >** to transfer this name to the **Test Variable** Box
3. Highlight **Brandy** by clicking on it then
  - a. Click on **arrow >** to transfer this name to the **Test Variable** Box
4. Highlight **Brandz** by clicking on it then
  - a. Click on **arrow >** to transfer this name to the **Test Variable** Box
5. If one the white square next **Friedman** is not already checked, click on it to place a check mark there
6. Click on **Statistics** button at bottom corner of screen
  - a. Click on white square next to **Descriptives** to place a check mark in the box
  - b. Click on **continue** button
7. Click **OK**. Doing this will result in analysis being conducted. These results are below.

### Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Brand X Rank	10	1.2000	.42164	1.00	2.00
Brand Y Rank	10	2.3000	.82327	1.00	3.00
Brand Z Rank	10	2.5000	.52705	2.00	3.00

### Ranks

	Mean Rank
Brand X Rank	1.20
Brand Y Rank	2.30
Brand Z Rank	2.50

### Test Statistics<sup>a</sup>

N	10
Chi-Square	9.800
df	2
Asymp. Sig.	.007

a. Friedman Test

8. For the problem above the null and alternative hypothesis are spelled out below:

$H_{null}$ : There will be no difference in the participants' rank ordered preferences for Brand X, Brand Y, or Brand Z sodas.

$H_{alt}$ : There will be a difference in the participants' rank ordered preferences for Brand X, Brand Y, and Brand Z sodas.

9. **Interpretation and APA writing template for Results Above:**

A Friedman test was conducted to determine whether participants had a differential rank ordered preference for the three brands of soda. Results of that analysis indicated that there was a differential rank ordered preference for the three brands of soda,  $\chi^2(2) = 9.80, p < .05$ . A post hoc comparison of the rank ordered preferences for the three brands of soda was conducted using Nemenyi's \* procedure. Results of this analysis indicated that there were significantly more favorable rankings of Brand X soda over either Brand Y or Brand Z,  $p < .05$ . There was, however, no significant difference in how participants evaluated Brand Y and Brand Z sodas.

(\*) The option for conducting the Nemenyi test is not present in the SPSS procedure. This post test is conducted by hand. Refer to your textbook for how to conduct this test.