Wilcoxon Rank Sum Test (or Mann-Whitney) Test

Purpose: Wilcoxon Rank Sum Test (or Mann-Whitney) test is for comparing two populations using two independent random samples.

Example: Comparing median weights between male and female subjects using two independent samples.

Data: Two independent random samples of weights, one from male population and one from female population. Same data can be found at http://www.cc.ysu.edu/~ghchang/stat/studentp.sav .

Female (n_1=9)	135	119	106	135	180	108	128	160	143			
Male (n_2=13)	175	170	205	195	185	182	150	175	190	180	195	220	235

To perform Two Independent Samples *t*-Test for the data above:

1. **Create data file**: Enter the data in SPSS, with the variable "weight" takes up one column, and the sex variable for identifying whether the weight data was from male or female subject takes up another column. The "weight" is considered as the dependent, response or outcome variable, and the "sex" variable is the independent or factor variable. The two variables should be created in the way as seen in the data editor on the right. The sex variable takes on two possible values, 0 or 1. The value "0" for sex variable represents a female subject, and the value "1" for sex variable represents a male subject. It would be better if these values can be labeled as male and female.

2. **To perform the Wilcoxon Rank Sum test**, first click through the menu selections **Analyze / Nonparametric Tests / 2 Independent Samples…** as in the following picture, and the Two Independent-Samples Tests dialog box will appear on the screen.

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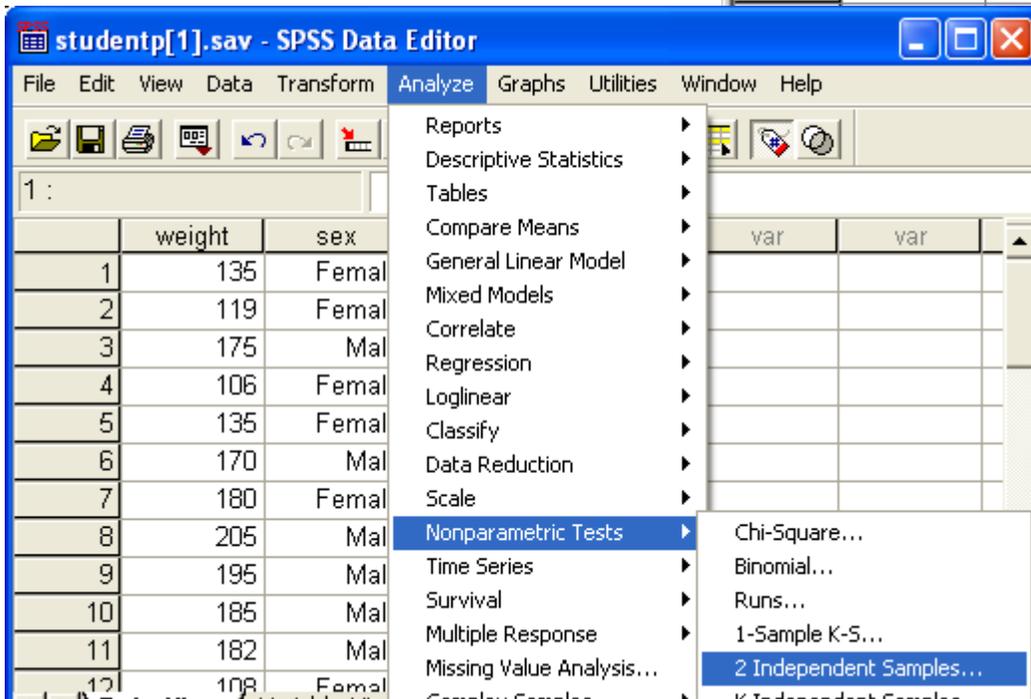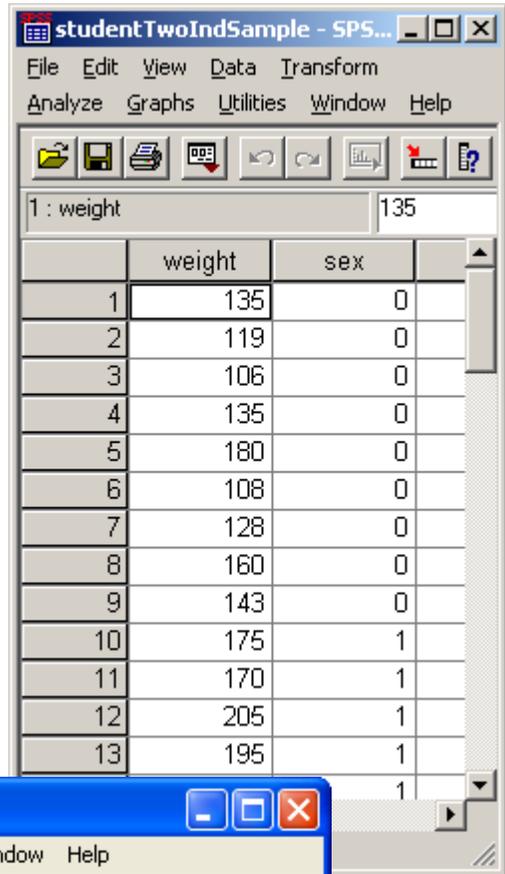
Select the variable "weight" to be analyzed into the **Test Variable List** box. And, select the sex variable and put it in Grouping Variable box. Click **Define Groups …** and enter the group variable values for identifying groups to be compared. Enter **1** in Group 1 box, and enter **0** for Group 2 box, since for the sex variable, 0 means female and 1 means male. Click **Continue** to exit from define group box. Check the Mann-Whitney box for Test Type. Mann-Whitney Test and Wilcoxon Rank Sum Test are the same test. And then click **OK** for performing the test. The results will be displayed in the SPSS Output window.
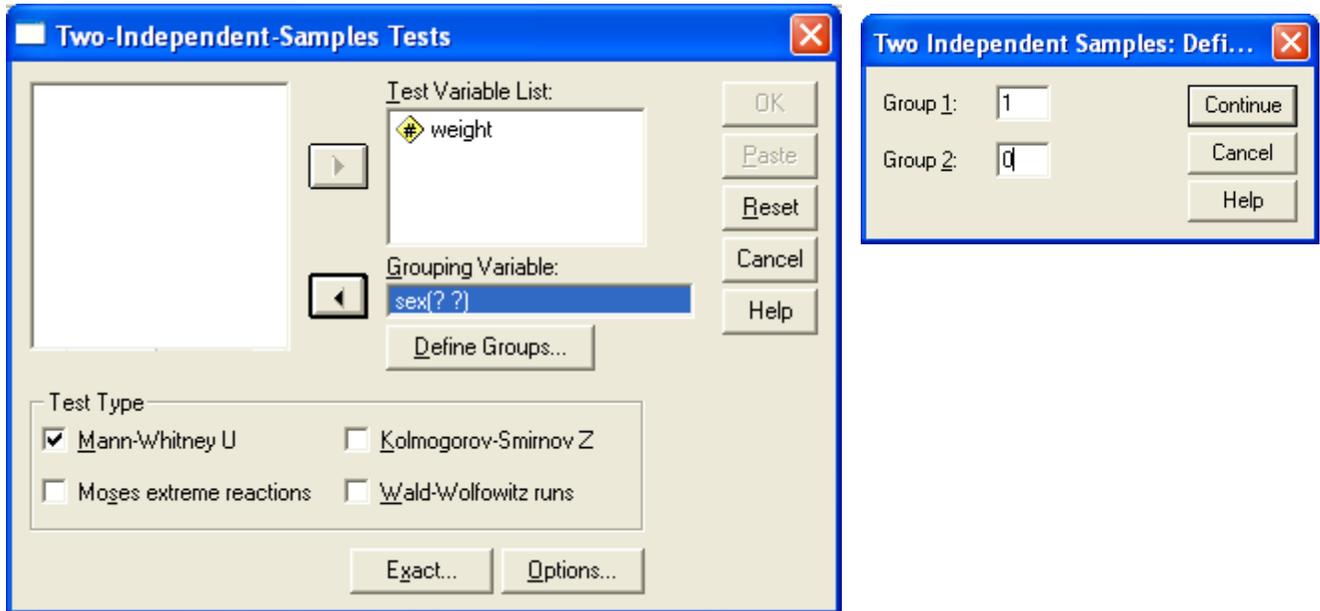
If you want SPSS to perform an exact test, then click on **Exact** button in the Two-Independent Samples tests dialog box, and the following Exact Tests dialog box will appear. Check the Exact bullet and specific the amount of time allowed for computing the exact sampling distribution of the Wilcoxon statistic, and click **Continue** button and click **OK** in the Two-Independent Samples tests dialog box.
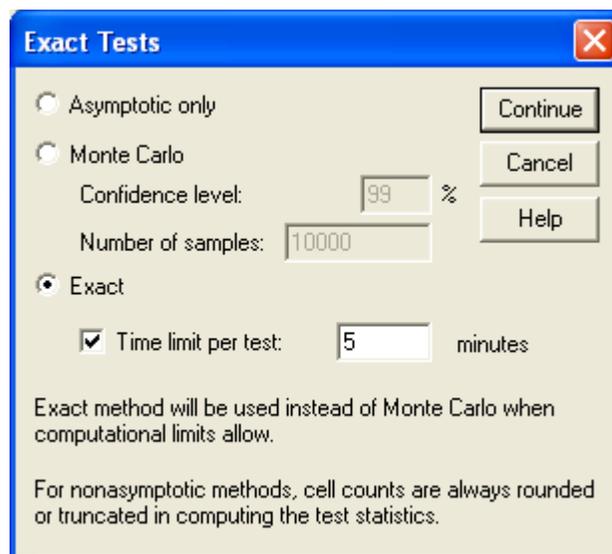
Interpret SPSS Output: The statistics for the test are in the following table.

For Two-sided test: The two-sided p-values from both **Asymptotic 2-tailed** and **Exact 2-tailed** are **0.000**.

For one-sided test: The first table shows that the mean rank from Female is less than mean rank from male. This suggest the median from male is higher than median for female. The p-value would be half of the p-value from two-tailed test and would be **0.000** in supporting that **the median weight for male is higher than the median weight for female**.

Mann-Whitney Test

Male subjects are heavier.

Ranks

	sex	N	Mean Rank	Sum of Ranks
weight	Female	9	5.61	50.50
	Male	13	15.58	202.50
	Total	22		

Test Statistics^b

	weight
Mann-Whitney U	5.500
Wilcoxon W	50.500
Z	-3.543
Asymp. Sig. (2-tailed)	.000
Exact Sig. [2*(1-tailed Sig.)]	.000^a
Exact Sig. (2-tailed)	.000
Exact Sig. (1-tailed)	.000
Point Probability	.000

p-values

a. Not corrected for ties.

b. Grouping Variable: sex