

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left(\frac{(N_1 - 1)s_1^2 + (N_2 - 1)s_2^2}{N_1 + N_2 - 2}\right)\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

# Social Science Statistics

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left(\frac{(N_1 - 1)s_1^2 + (N_2 - 1)s_2^2}{N_1 + N_2 - 2}\right)\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

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## Wilcoxon Signed-Rank Test Calculator

**Success!**

*Explanation of results*

We have calculated both a W-value and Z-value. If the size of *N* is at least 20 - see the Results Details box - then the distribution of the Wilcoxon W statistic tends to form a normal distribution. This means you can use the Z-value to evaluate your hypothesis. If, on the other hand, the size of *N* is low, and particularly if it's below 10, you should use the W-value to evaluate your hypothesis.

You should also note that if a subject's difference score is zero - that is, if a subject has the same score in both treatment conditions - then the test discards the individual from the analysis and reduces the sample size. If you have a lot of ties, this procedure will undermine the reliability of the test (and also suggests that the requirement that the data is continuous has not been met).

Treatment 1	Treatment 2	Sign	Abs	R	Sign R
3879,	3171,	1	708	8	8
2310,	2974,	n/a	0	n/a	n/a
2162,	3146,	-1	664	7	-7
2490,	2566,	n/a	0	n/a	n/a
2784,	3617,	-1	984	12	-12
2809,	2381,	n/a	0	n/a	n/a
3025,	2259,	-1	76	1	-1
2048,	2275,	n/a	0	n/a	n/a
2613,	2251,	-1	833	10	-10
3418,	2251,	n/a	0	n/a	n/a
2170,	2792,	1	428	5	5
3473,	3764,	n/a	0	n/a	n/a
2013	2866	1	766	9	9
		n/a	0	n/a	n/a
		-1	227	2	-2
		n/a	0	n/a	n/a
		1	362	4	4
		n/a	0	n/a	n/a
		1	1167	13	13
		n/a	0	n/a	n/a
		-1	622	6	-6
		n/a	0	n/a	n/a

Significance Level:  
☐ 0.01  
☒ 0.05  
1 or 2-tailed hypothesis?:  
☐ One-tailed  
☒ Two-tailed

Result Details  
W-value: 39  
Mean Difference: 2707.23  
Sum of pos. ranks: 39  
Sum of neg. ranks: 52  
  
Z-value: -0.4543  
Mean (W): 45.5  
Standard Deviation (W): 14.31  
  
Sample Size (N): 13

*Result 1 - Z-value*

The Z-value is -0.4543. The p-value is 0.65272. The result is *not* significant at  $p \leq 0.05$ .

*Result 2 - W-value*

The W-value is 39. The critical value of *W* for *N* = 13 at  $p \leq 0.05$  is 17. Therefore, the result is *not* significant at  $p \leq 0.05$ .

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