

- III. Darin wants to reexamine the number of sick days taken by employees based upon education. This data was first presented on page 100. At that time it was assumed the populations were approximately normal with the same variance. As a result, population means were compared. Assume these assumptions might not be true and use a Mann-Whitney .01 level of significance test to determine whether these samples come from populations with equal medians.

Graduates' sick days: 5, 4, 7, 2, 7, 7, 0, 3, 6, 8, 6 Non-graduates' sick days: 9, 13, 8, 6, 14, 6, 12, 16, 8, 10, 7, 11

People Using Statistics Software should not use this chart.

Complete this table by: (1) completing an ordered array, (2) assigning a G for graduates and an N for non-graduates to each element of the array, (3) assigning each rank to the appropriate category (non-graduate or graduate), (4) calculating each subtotal, and (5) calculating R_1 , which equals the sum of the 3 subtotals for non-graduates or R_2 which equals the sum of the 3 subtotals for graduates.

Rank		Ranked Scores		Rank		Ranked Scores		Rank		Ranked Scores	
Ordered Array and Degree Status		Grads (3)	Non-grads (3)	Ordered Array and Degree Status		Grads (3)	Non-grads (3)	Ordered Array and Degree Status		Grads (3)	Non-grads (3)
(1)	(2)			(1)	(2)			(1)	(2)		
1.	0 G	1		9.	6 G	7.5		17.	9 N		17
2.	2 G	2		10.	7 N		11.5	18.	10 N		18
3.	3 G	3		11.	7 G	11.5		19.	11 N		19
4.	4 G	4		12.	7 G	11.5		20.	12 N		20
5.	5 G	5		13.	7 G	11.5		21.	13 N		21
6.	6 N		7.5	14.	8 N		15	22.	14 N		22
7.	6 N		7.5	15.	8 N		15	23.	16 N		23
8.	6 G	7.5		16.	8 G	15					
(4) Subtotal		22.5	15.0	(4) Subtotal		57.0	41.5	(4) Subtotal		0	140

$$(5) R_1 = 22.5 + 57 + 0 = 79.5$$

$$(5) R_2 = 15.0 + 41.5 + 140.0 = 196.5$$

$$\begin{aligned}
 U_1 &= n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1 \\
 &= 11(12) + \frac{11(11+1)}{2} - 79.5 \\
 &= 132 + 66 - 79.5 \\
 &= 118.5
 \end{aligned}$$

$$\begin{aligned}
 \mu_U &= \frac{n_1 n_2}{2} \\
 &= \frac{11(12)}{2} \\
 &= 66
 \end{aligned}$$

$$\begin{aligned}
 \sigma_U &= \sqrt{\frac{n_1 n_2 (n_1 + n_2 + 1)}{12}} \\
 &= \sqrt{\frac{11(12)(11+12+1)}{12}} \\
 &= \sqrt{\frac{3,168}{12}} \\
 &= 16.248
 \end{aligned}$$

$$\begin{aligned}
 Z &= \frac{U - \mu_U}{\sigma_U} \\
 &= \frac{118.5 - 66.00}{16.248} \\
 &= 3.23
 \end{aligned}$$

The critical value for z is 2.575.
 H_0 is rejected because z of 3.23 is beyond 2.575.

Median sick days differ.