Mann-Whitney-Wilcoxon Test
Applied to the age of patients at two clinics.

		Clinic 1				Clinic 2			
t_j	Ranks	Age	Number	Average Rank	W_X	Age	Number	Average Rank	W_Y
4	1- 4	15	4	2.5	10.0	15			
10	5-14	16	8	9.5	76.0	16	2	9.5	19.0
10	15-24	17	7	19.5	136.5	17	3	19.5	58.5
12	25-36	18	5	30.5	152.5	18	7	30.5	213.5
11	37-47	19	3	42.0	126.0	19	8	42.0	336.0
8	48-55	20	3	51.5	154.5	20	5	51.5	257.5
5	56-60	21	2	58.0	116.0	21	3	58.0	174.0
4	61-64	22	2	62.5	125.0	22	2	62.5	125.0
3	65-67	23	1	66.0	66.0	23	2	66.0	132.0
2	68-69	24				24	2	68.5	137.0
2	70-71	25	1	70.5	70.5	25	1	70.5	70.5
1	72	27	1	72.0	72.0				
1	73					28	1	73.0	73.0
2	74-75	30	1	74.5	74.5	30	1	74.5	74.5
1	76	31	1	76.0	76.0				
2	77-78	32	1	77.5	77.5	32	1	77.5	77.5
1	79					35	1	79.0	79.0
1	80					36	1	80.0	80.0
			m=40		1333.0		n=40		1907.0

$H : \eta_Y = \eta_X \qquad U_X = W_X - \frac{m(m+1)}{2} = 1333 - \frac{40(41)}{2} = 1333 - 820 = 513$

$A : \eta_Y \neq \eta_X \qquad U_Y = W_Y - \frac{n(n+1)}{2} = 1907 - \frac{40(41)}{2} = 1907 - 820 = 1087$

mean of $U_Y = \frac{mn}{2} = \frac{40(40)}{2} = 800$

std dev of $U_Y = \sqrt{\frac{mn(m+n+1)}{12} - \frac{mn\sum t_j(t_j^2-1)}{12(m+n)(m+n-1)}}$

$$= \sqrt{\frac{40(40)}{12}\left[81 - \frac{4(15)+10(99)+10(99)+12(143)+11(120)+8(63)+5(24)+4(15)+3(8)+2(3)+2(3)+2(3)+2(3)}{(80)(79)}\right]}$$

std dev of $U_Y = \sqrt{\frac{1600}{12}\left[81 - \frac{5808}{80(79)}\right]} = \sqrt{10677.468} = 103.33$

P-value $= 2P\left(Z \geq \frac{1087-0.5-800}{103.33}\right) = 2P(Z \geq 2.77) = 2(0.0028) = 0.0056$

Since the P-value is so small (smaller than 0.05), we Reject H and conclude that there is a difference in the distribution of ages for the two clinics.

Minitab analysis of clinic data.

Mann-Whitney Confidence Interval and Test

Clinic 1	N = 40	Median = 18.0
Clinic 2	N = 40	Median = 19.5

Point estimate of ETA1 – ETA2 is -2.000

95.1 Percent CI for ETA1 – ETA2 is $(-3.001, -1.000)$

W = 1333.0

Test of ETA1 = ETA2 vs ETA1 not = ETA2 is significant at 0.0058

The test is significant at 0.0056 (adjusted for ties)