Mann Whitney U test

This is an extension of sum of the rank test. This is one of the most imp. & powerful non parametric test of significance. At the same time it is an useful alternative of parametric 't' test. When an investigator wants to test the significance of difference between independent samples drawn from same population or drawn from two indep. populations & he has doubts about the normality of the distribution. Mann-Whitney U test is one of the imp. alternatives that he can have from the statistics. The power of efficiency of Mann W. U. test is 95.5%. It can be used with groups having diff. numbers or diff. sig. N = total no. But this test has its own limitation. It should not be used with such distributions that have frequent ties. The steps of Mann Whitney U. test are

1) Scores of the both groups are jointly ranked.

based on the statistic U. In a small sample U is expressed by the nos. of scores in the group levelled as preceeds the no. of scores in n_1. The group having smaller no. is assigned as n_1 + the group having larger no. is assigned as n_2. $U_1 = n_1 n_2 - U_1$. Where as n_1 is the total no. in smaller gr. N_2 total no. in larger group + U_1 = Sum total of ranks in n_1 group. In larger sample when there is no tie in distri.

$$U = n_1 n_2 + \frac{n_1 (n_1+1)}{2} - R_1 \text{ or}$$

$$n_1 n_2 + \frac{n_2 (n_2+1)}{2} - R_2$$

Find out the Z value for u.

$$Z = \frac{2U_1 - n_1(N+1)}{\sqrt{\frac{n_1 n_2 (N+1)}{3}}}$$

Sum of the Tie i.e $\Sigma T = t^3 - t$

If there is tie in distri. then we use this formula:-

$$Z = \frac{2U_1 - n_1 (N+1)}{\sqrt{\frac{n_1 n_2}{N(N-1)} \left(\frac{N^3 - N - \Sigma T}{3}\right)}}$$