|  |
| --- |
| **The Mann-Whitney U test**  The Mann-Whitney U test is a non-parametric test that can be used in place of an unpaired t-test. It is used to test the null hypothesis that two samples come from the same population (i.e. have the same median) or, alternatively, whether observations in one sample tend to be larger than observations in the other. Although it is a non-parametric test it does assume that the two distributions are similar in shape. **Assumptions**  1. Your **dependent variable** should be measured at the **ordinal** or **continuous level**. 2. Your **independent variable** should consist of **two categorical**, **independent groups**. Example independent variables that meet this criterion include gender (2 groups: male or female), employment status (2 groups: employed or unemployed), smoker (2 groups: yes or no), and so forth. 3. You should have **independence of observations**, which means that there is no relationship between the observations in each group or between the groups themselves. 4. A Mann-Whitney U test can be used when your two variables are **not normally distributed**.   **Working Procedure:**   1. Choose LOS. 2. Choose Null Hypothesis and Alternative Hypothesis. 3. Rank all scores together, ignoring which group they belong to. The lowest score gets a rank of "1", the next lowest gets a rank of "2", and so on. If two or more scores are identical, this is a "tie". They get the average of the ranks that they would have obtained, had they been different from each other. 4. Add up the ranks for sample I and sample II to get Rank Sum R1 and R2. 5. Calculate U1 and U2 using the formulas:        1. Find out U=Min(U1,U2) 2. Calculate z statics      1. Conclusion: 2. If z value< ztab, accept null hypothesis. 3. If z value> ztab, reject null hypothesis. |
| 1. It is generally believed that as people grow older, they find it harder to go to sleep. To test if there was a difference in time in min before people actually went to sleep after lying in the bed, a sample of 10 young persons and 10 old persons was randomly selected and their sleeping habits were monitored. The data show the number of minutes these 20 persons were awake in bed before getting to sleep.  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Young | 58 | 42 | 68 | 20 | 15 | 35 | 26 | 40 | 47 | 28 | | Old | 100 | 152 | 147 | 70 | 40 | 95 | 68 | 90 | 112 | 58 |   Is there evidence that young men are significantly take more time to get to sleep than old men? Use 0.05 LOS   1. 24 applicants for a position are interviewed by 3 administrators and rated on a scale of 5 as to suitability for the position. Each applicant is given a suitability score which is the sum of the three numbers. 12 of the applicants had completed at least two years of college. Use the Mann Whitney test to determine whether there was a difference in the scores of the two groups. Use 5% LOS. Group A had an educational background of less than two years of college. While group B had completed at least two years of college.  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Group A | 7 | 11 | 9 | 4 | 8 | 6 | 12 | 11 | 9 | 10 | 11 | 11 | | Group B | 8 | 9 | 13 | 14 | 11 | 10 | 12 | 14 | 13 | 9 | 10 | 8 |      1. Consider a Phase II clinical trial designed to investigate the effectiveness of a new drug to reduce symptoms of asthma in children. A total of n=10 participants are randomized to receive either the new drug or a placebo. Participants are asked to record the number of episodes of shortness of breath over a 1 week period following receipt of the assigned treatment. The data are shown below.  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Placebo** | 7 | 5 | 6 | 4 | 12 | | **New Drug** | 3 | 6 | 4 | 2 | 1 |   Is there a difference in the number of episodes of shortness of breath over a 1 week period in participants receiving the new drug as compared to those receiving the placebo? By inspection, it appears that participants receiving the placebo have more episodes of shortness of breath, but is this statistically significant? |