**Date:** 22 September, 2015

**Experiment No. 6**

**Aim:** To perform Wald – Wolfowitz run test. To perform Kruskal-Wallis test.

**Experiment:** Test if the following 3 random samples come from a common parent population or not using Kruskal-Wallis test.

Sample I: 1.7 1.9 6.1 12.5 16.5 25.1 30.5 42.1 82.5

Sample II: 13.6 19.8 25.2 46.2 61.2

Sample III: 13.4 20.9 25.1 29.4 46.9

**Theory:**

The Kruskal–Wallis test by ranks is a non-parametric method for testing whether samples originate from the same distribution. It is used for comparing two or more independent samples of equal or different sample sizes. The parametric equivalent of the Kruskal-Wallis test is the one-way analysis of variance (ANOVA).

**H0:** Samples come from common parent population.

**H1:** Samples do not come from common parent population.

Test Statistic:

Where,

G: Number of grouping.

ti: Number of tied values in ith grouping.

N = n1+ n2+……..+ ng

g: Number of samples considered

ni: Sample size of ith sample.

r̅i: Avg. of ranks of ith sample.

Test Criteria:

Reject H0 at α(100)% level of significance if H > χ2(g-1)(α/2) or H < χ2(g-1)(1-α/2) otherwise accept.

**Algorithm:**

1. Open the file “kwt6.txt” to read the data and “kwtout6.txt” to write the results using pointers.
2. Scan the number of observations from each sample in the array and merge them in cs1[ ].
3. Sort the array cs1[ ] in ascending order and rank them.
4. Calculate the sum of ranks of each sample.
5. Use Chi-square test to test the hypothesis.
6. Results are expected in the file “kwtout6.txt”.

**Additional:**

Tabulate χ2(g-1)(α/2) and χ2(g-1)(1-α/2) , where α = 0.05 is computed in excel using CHIINV(0.025,2) and CHIINV(0.975,2) in Microsoft Excel.

This comes out to be 7.38 and 0.051 respectively.

**Results:**

K=1.497193

H=1.498507

**Conclusion:**

Since χ2(g-1)(1-α/2) < H < χ2(g-1)(α/2), we fail to reject H0 at 5% level of significance.

Hence we conclude that samples come from common parent population.