

THE KRUSKAL-WALLIS TEST

The only requirements of the Kruskal-Wallis Test are:

- 1.- The k samples are random and independent
- 2.- There are 5 or more measurements per sample
- 3.- The probability distributions are continuous

Example:

Sample 1	Ranks	Sample 2	Ranks	Sample 3	Ranks
8.2	1	10.2	7	13.5	12
10.3	8	9.1	4	8.4	2
9.1	4	13.9	14	9.6	6
12.6	10	14.5	15	13.8	13
11.4	9	9.1	4	17.4	18
13.2	11	16.4	17	15.3	16
	$R_1 = 43$		$R_2 = 61$		$R_3 = 67$

Step 1

H_0 : the 3 probability distributions are identical

or H_a : At least two of the 3 probability distributions differ in location

Step 2 Calculate the test statistic

8.2	8.4	9.1	9.1	9.1	9.6	10.2	10.3	11.4	12.6	13.2	13.5
1	2	3	4	5	6	7	8	9	10	11	12
1	2	4	4	4	6	7	8	9	10	11	12

13.8	13.9	14.5	15.3	16.4	17.4
13	14	15	16	17	18
13	14	15	16	17	18

$$R_1 = 43$$

$$R_2 = 61$$

$$R_3 = 67$$

$$n = 18$$

$$n_1 = 6$$

$$n_2 = 6$$

$$n_3 = 6$$

$$k = 3$$

$$H = \frac{12}{n(n+1)} \sum_{i=1}^k \frac{R_i^2}{n_i} - 3(n+1)$$

$$= \frac{12}{n(n+1)} \left(\frac{R_1^2}{n_1} + \frac{R_2^2}{n_2} + \frac{R_3^2}{n_3} \right) - 3(n+1)$$

$$= \frac{12}{18 \times 19} \left(\frac{43^2}{6} + \frac{61^2}{6} + \frac{67^2}{6} \right) - 3(19) \approx 1.82$$

test statistic

Step 3 Rejection Region (chi-square)

$$RR: H > \chi_{\alpha, k-1}^2$$

$$\alpha = .05$$

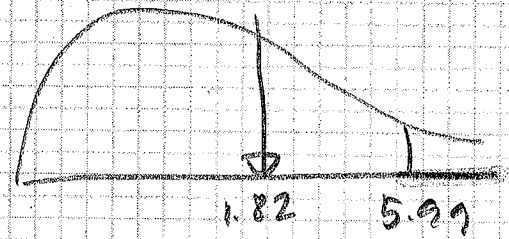
$$df = k - 1 = 2$$

$$RR: H > 5.99$$

Step 4

Decision

Fail to reject H_0



Step 5

Conclusion: "the data provide insufficient evidence, at $\alpha = .05$, to conclude that at least two of the three probability distributions differ in location"