PES University, Bangalore
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UE19CS203 – STATISTICS FOR DATA SCIENCE
Unit-4 - Hypothesis and Inference

QUESTION BANK – SOLVED

Distribution Free Tests:

Exercises for section 6.9: [Text Book Exercise 6.9– Pg. No. [457 – 458]]

1. The article "*n*-Nonane Hydro conversion on Ni and Pt Containing HMFI, HMOR and HBEA" (G. Kinger and H. Vinek, *Applied Catalysis A: General*, 2002:139–149) presents hydro conversion rates (in μmol/g · s) of *n*-nonane over both HMFI and HBEA catalysts. The results are as follows:

HMFI: 0.43 0.93 1.91 2.56 3.72 6.19 11.00

HBEA: 0.73 1.12 1.24 2.93

Can you conclude that the mean rate differs between the two catalysts?

[Text Book Exercise – Section 6.9 – Q. No.6 – Pg. No. 458]

Solution:

Let us assume α =5%=0.05.

$$H_0: \mu_1 = \mu_2$$

$$H_0: \mu_1 \neq \mu_2$$

Determine the rank of every data value. The smallest value receives the rank 1, the second smallest value receives the rank 2, the third smallest value receives the rank

3 and so on. If multiple data values have the same value, then their rank is the average of the corresponding ranks.

Sample 1	Rank	Sample 2	Rank
0.43	1	0.73	2
0.93	3	1.12	4
1.91	6	1.24	5
2.56	7	2.93	8
3.72	9		
6.19	10		
11	11		
Sum	47	Sum	19

Add all ranks of the smallest sample: W=2+4+5+8=19

The P-value is the probability of obtaining a value more extreme or equal to the value W. Determine the corresponding probability using table in the row m=4,n=7,w=19.

P > 2(0.0545)=0.1090 (note that we double the values because the test is two-tailed)

If the probability is less than the significant level, then reject the null hypothesis.

P > 0.05=> Fail to reject H_0.

There is not sufficient evidence to support the claim that the mean rate differs between the two catalysts.