

Comparing Centers of Several Independent Groups (2024 Spring EN5423 – week10)

Your student id # _____

Quiz

We have collected data from three groups, representing different conditions in an experiment. Each group has five observations. Your task is to rank the data from all groups together, compute the average ranks for each group, and then calculate the Kruskal-Wallis test statistic.

Data:

- **Group A:** 20, 22, 25, 30, 28
- **Group B:** 18, 24, 19, 21, 23
- **Group C:** 15, 17, 16, 14, 13

Steps:

1. **Combine and Rank the Data:**
 - Combine all observations from the three groups.
 - Rank the data from the smallest to the largest.
2. **Assign Ranks:**
 - If values are the same among different observations, assign the average rank.
3. **Calculate Average Ranks:**
 - Sum the ranks for each group and then divide by the number of observations in that group to get the average rank.
4. **Compute Kruskal-Wallis Test Statistic K :**
 - Use the formula based on the ranks and the number of observations.

Step 1 & 2: Combined Ranking

Data Point	Group	Rank
13	C	1
28	A	14

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Step 3: Average Ranks

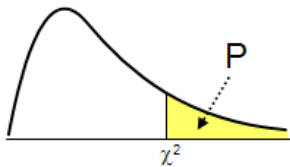
- Group A Average Rank: $\frac{\quad}{5} =$
- Group B Average Rank: $\frac{\quad}{5} =$
- Group C Average Rank: $\frac{\quad}{5} =$

Step 4: Compute Kruskal-Wallis Test Statistic K

$$K = \frac{12}{(\quad \cdot \quad)} (\quad + \quad + \quad) =$$

Final Questions:

Given the calculated Kruskal-Wallis test statistic K and assuming an alpha level of $\alpha = \mathbf{0.05}$, determine whether at least one of the three groups (A, B, C) differs significantly from the others in terms of their central tendencies. Use the appropriate chi-squared distribution critical value for comparison.



	P										
DF	0.995	0.975	0.20	0.10	0.05	0.025	0.02	0.01	0.005	0.002	0.001
1	0.0000393	0.000982	1.642	2.706	3.841	5.024	5.412	6.635	7.879	9.550	10.828
2	0.0100	0.0506	3.219	4.605	5.991	7.378	7.824	9.210	10.597	12.429	13.816
3	0.0717	0.216	4.642	6.251	7.815	9.348	9.837	11.345	12.838	14.796	16.266
4	0.207	0.484	5.989	7.779	9.488	11.143	11.668	13.277	14.860	16.924	18.467