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ROLL NO :53

Experiment No. 6

Aim: To study the datasets using Wilcoxon test, Mannwhitneyu test & Kolmogorov Smirnov test.

Mannwhitneyu test

Q.1 –

In [71]:

```
from scipy.stats import mannwhitneyu
```

Sample data for two groups (independent samples)

In [72]:

```
group1 = [14, 15, 16, 17, 18]
group2 = [20, 21, 22, 23, 24]
```

Perform Mann-Whitney U test

In [73]:

```
statistic, p_value = mannwhitneyu(group1, group2)
```

Output the test statistic and p-value

In [74]:

```
print("Mann-Whitney U test statistic:", statistic)
print("P-value:", p_value)
```

Mann-Whitney U test statistic: 0.0
P-value: 0.006092890177672406

Check if the p-value is less than 0.05

In [75]:

```
alpha = 0.025
```

In [76]:

```
if p_value < alpha:print("Reject the null hypothesis: There is a significant difference between the groups.")
else:print("Fail to reject the null hypothesis: There is no significant difference between the groups.")
```

Reject the null hypothesis: There is a significant difference between the groups.

Q.2 – Sample Data by your own and try to implement

Sample data for two groups (independent samples)

In [77]:

```
group1 = [1, 2, 3, 12, 8]
group2 = [22, 23, 2, 61, 9]
```

Perform Mann-Whitney U test

In [78]:

```
statistic, p_value = mannwhitneyu(group1, group2)
```

Output the test statistic and p-value

In [79]:

```
print("Mann-Whitney U test statistic:", statistic)
print("P-value:", p_value)
```

Mann-Whitney U test statistic: 4.5
P-value: 0.05803697165495

Check if the p-value is less than 0.05

In [80]:

```
alpha = 0.025
```

In [81]:

```
if p_value < alpha: print("Reject the null hypothesis: There is a significant difference between the groups.")
else: print("Fail to reject the null hypothesis: There is no significant difference between the groups.")
```

Fail to reject the null hypothesis: There is no significant difference between the groups.

Kolmogorov Smirnov test

Q.1 –

In [82]:

```
from scipy.stats import ks_2samp
```

Sample data for two groups (independent samples)

In [83]:

```
dataset1 = [14, 15, 16, 17, 18]
dataset2 = [20, 21, 22, 23, 24]
```

Perform Mann-Whitney U test

In [84]:

```
statistic, p_value = ks_2samp(dataset1, dataset2)
```

Output the test statistic and p-value

In [85]:

```
print("Kolmogorov-Smirnov test statistic:", statistic)
print("P-value:", p_value)
```

Kolmogorov-Smirnov test statistic: 1.0
P-value: 0.007936507936507936

Check if the p-value is less than 0.05

In [86]:

```
alpha = 0.025
```

In [87]:

```
if p_value < alpha: print("Reject the null hypothesis: The two datasets significantly differ.")
else: print("Fail to reject the null hypothesis: There is no significant difference between the datasets.")
```

Reject the null hypothesis: The two datasets significantly differ.

Q.2 Sample Data by your own and try to implement

Sample data for two groups (independent samples)

In [88]:

```
dataset1 = [4, 5, 6, 1, 2]
dataset2 = [20, 1, 22, 29, 24]
```

Perform Mann-Whitney U test

In [89]:

```
statistic, p_value = ks_2samp(dataset1, dataset2)
```

Output the test statistic and p-value

In [90]:

```
print("Kolmogorov-Smirnov test statistic:", statistic)
print("P-value:", p_value)
```

Kolmogorov-Smirnov test statistic: 0.8
P-value: 0.07936507936507936

Check if the p-value is less than 0.05

In [91]:

```
alpha = 0.025
```

In [92]:

```
if p_value < alpha: print("Reject the null hypothesis: The two datasets significantly differ.")
else: print("Fail to reject the null hypothesis: There is no significant difference between the datasets.")
```

Fail to reject the null hypothesis: There is no significant difference between the datasets.

Wilcoxon test

Q.1 –

In [93]:

```
from scipy.stats import wilcoxon
```

Sample data: before and after treatment

In [94]:

```
before = [25, 30, 28, 35, 32, 29, 27, 31, 33, 30]
after = [22, 29, 26, 32, 30, 28, 25, 30, 31, 29]
```

Perform the Wilcoxon signed-rank test

In [95]:

```
statistic, p_value = wilcoxon(before, after)
```

Output the test statistic and p-value

In [96]:

```
print("Wilcoxon signed-rank test statistic:", statistic)
print("P-value:", p_value)
```

Wilcoxon signed-rank test statistic: 0.0
P-value: 0.001953125

Check if the p-value is less than 0.05 (assuming a significance level of 0.05)

In [97]:

```
alpha = 0.05
```

In [98]:

```
if p_value < alpha: print("Reject the null hypothesis: There is a significant difference.")
else: print("Fail to reject the null hypothesis: There is no significant difference.")
```

Reject the null hypothesis: There is a significant difference.

Q.2 Sample Data by your own and try to implement

Sample data: before and after treatment

In [99]:

```
before = [15, 35, 29, 25, 11, 99, 87, 32, 39, 39]
after = [12, 28, 16, 12, 10, 78, 95, 35, 38, 28]
```

Perform the Wilcoxon signed-rank test

In [100]:

```
statistic, p_value = wilcoxon(before, after)
```

Output the test statistic and p-value

In [101]:

```
print("Wilcoxon signed-rank test statistic:", statistic)
print("P-value:", p_value)
```

Wilcoxon signed-rank test statistic: 9.5
P-value: 0.083984375

Check if the p-value is less than 0.05 (assuming a significance level of 0.05)

In [102]:

```
alpha = 0.05
```

In [103]:

```
if p_value < alpha: print("Reject the null hypothesis: There is a significant difference.")
else: print("Fail to reject the null hypothesis: There is no significant difference.")
```

Fail to reject the null hypothesis: There is no significant difference.

Conclusion - The Datasets are studied successfully using above tests.