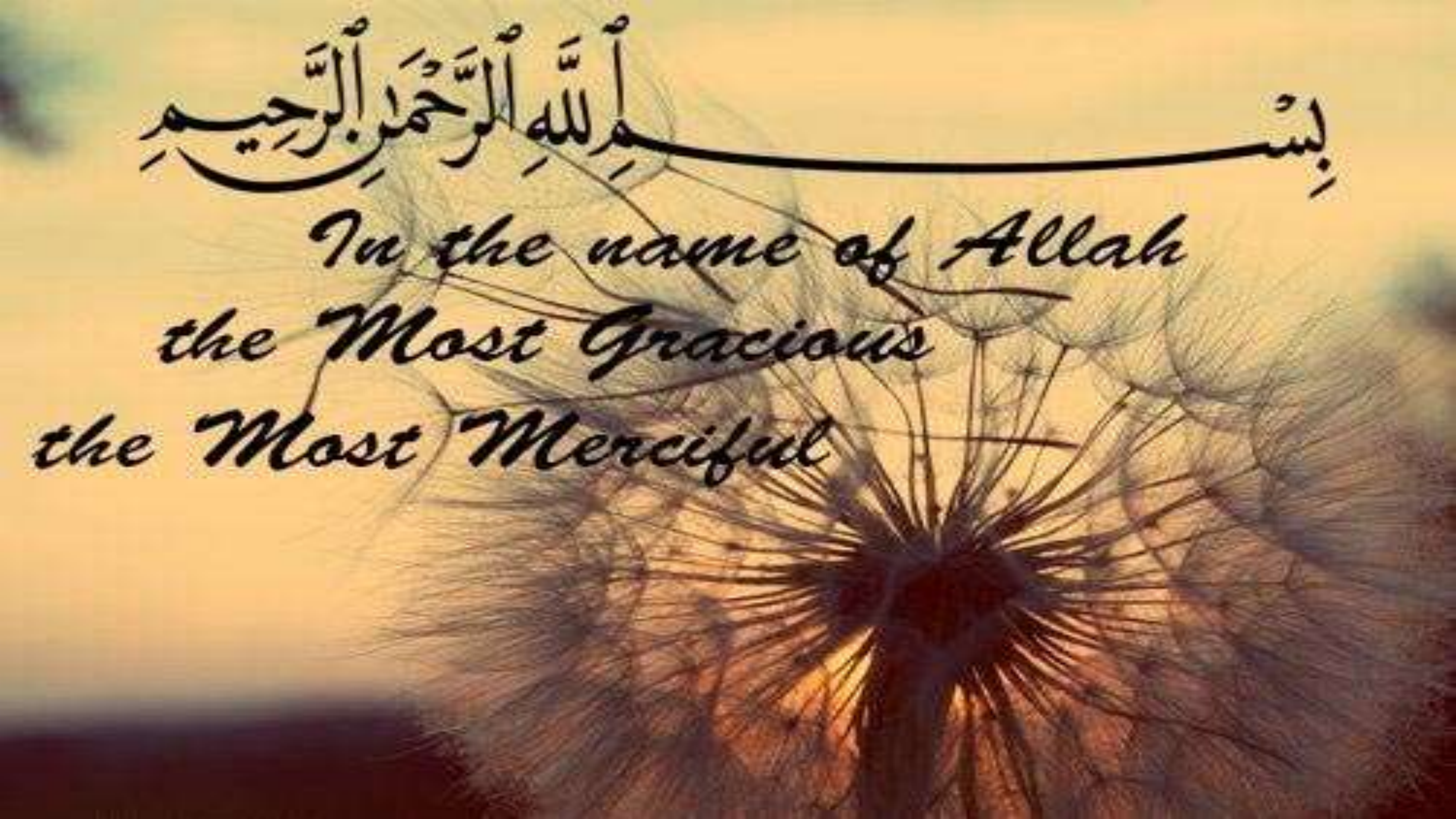
بِسْمِ ٱللَّهِ ٱلرَّحْمَٰنِ ٱلرَّحِيمِ
In the name of Allah
the Most Gracious
the Most Merciful

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Group # 02

MOSES TEST

Moses Test

- Another test for equality of dispersion parameters was proposed by Moses.
- Moses test dose not assume the equality of location parameter.

Assumptions

- The data consist of 2 random samples $X_1, X_2, \dots, X_n$ & $Y_1, Y_2, \dots, Y_n$ from papulation 1 and 2 respectively.
- The population distribution are continuous, are measured on at least interval scale.
- The two samples are independent.

General procedure

1. Hypotheses

- Two sided

$H_o: \sigma_1 = \sigma_2$

$H_1: \sigma_1 \neq \sigma_2$

- One sided

lower tail: $H_o: \sigma_1 \geq \sigma_2$, $H_1: \sigma_1 < \sigma_2$

upper tail: $H_o: \sigma_1 \leq \sigma_2$, $H_1: \sigma_1 > \sigma_2$

Continued..

2. Level of Significance

$$\alpha = 0.05$$

3. Test statistic

$$T = S - \frac{m_1\,(m_1 + 1)}{2}$$

4. Calculation

- Divide the both observations in to sub-samples of k equal size randomly.
- For each sample compute sum of squares (SS).
- Arrange SS in ascending order and assign ranks.
- Find S and T

Continued..

5. Critical Region

- Two sided:

$$w_{\alpha/2} \leq T \leq w_{1-\alpha/2} \quad \text{where} \quad w_{1-\alpha/2} = n_1 n_2 - w_{\alpha/2}$$

- Lower Tail:

$$T < w_\alpha$$

- Upper Tail:

$$T > w_{1-\alpha} \quad \text{where} \quad w_{1-\alpha} = n_1 n_2 - w_\alpha$$

Example 3.6

Check whether these data provide sufficient evidence to indicate a difference in dispersion between the two populations represented by the observed samples using 5% level of significance.

***X* values** 26	30	32	17	21	27	26	44
35	14	16	18	17	23	29	16
13	36	28	23	24	34	52	35

***Y* values** 47	66	51	44	80	65	58
65	61	64	51	56	76	58
61	48	55	68	59	60	58

Continued..

1. Hypotheses:

$$H_{\boldsymbol{o}}: \sigma_{\mathbf{1}} = \sigma_{\mathbf{2}}$$

$$H_{\mathbf{1}}: \sigma_{\mathbf{1}} \neq \sigma_{\mathbf{2}}$$

2. Level of significance:

$$\alpha = 0.05$$

3. Test statistic:

$$T = S - \frac{m_1\,(m_1 + 1)}{2}$$

Continued..

4. Calculations:

Let K=4 then, $m_1 = 6$ & m_2= 5 (discard 1 value)

Random subdivision of the X observations

Sub samples	Observations				Sum of Squares
1	26	32	35	24	78.75
2	26	36	18	23	172.75
3	18	16	30	13	166.75
4	35	27	29	29	38.75
5	52	17	14	17	978.00
6	21	44	23	34	341.00

Continued..

Random subdivision of the Y observations					
Sub samples	**observations**				**Sum of Squares**
1	60	58	48	61	106.75
2	80	58	58	61	336.75
3	54	56	51	51	113.00
4	55	44	66	65	317.00
5	59	76	68	47	465.00

Sum of Squares & corresponding ranks			
SS (X group)	**Rank**	**SS (Y group)**	**Rank**
38.75	1	106.75	3
78.75	2	113.00	4
166,75	5	317.00	7
172.75	6	336.75	8
341.00	9	465.00	10
978.00	11		
Total	**34**		

$$T = S - \frac{m_1(m_1 + 1)}{2}$$

$$T = 34 - \frac{6(6 + 1)}{2} = 13$$

5. Critical Region:

$$w_{\alpha/2} \leq T \leq w_{1-\alpha/2}$$

where $$w_{1-\alpha/2} = n_1 n_2 - w_{\alpha/2}$$

Continued..

6. Decision

$$w_{\alpha/2} \leq T \leq w_{1-\alpha/2}$$

$w_{\alpha/2}$=4 using $n_1 = 6$ & n_2= 5 (Table A.7)

$w_{1-\alpha/2}$= 26 using $w_{1-\alpha/2} = n_1 n_2 - w_{\alpha/2}$

$$w_{\alpha/2} \leq T \leq w_{1-\alpha/2}$$

$4 \leq 13 \leq 26$ do not reject H_o

Advantages

- It does not depend on assumptions of equal location parameter (median).

Disadvantages

- Inefficient
- Different people applying the test will obtain different values because of a random process.
- One sub-division may lead to significant results where another does not.

ANY QUESTION??


Thank You