

F test: Test between the means of more than two groups

Groups	
1 (X)	Group1
2(X)	
5(X)	
2(X)	Group2
4(X)	
2(X)	
2(X)	Group3
3(X)	
4(X)	
Grand Mean (GM)= 2.78	

Group 1	Group 2	Group 3
1(X ₁)	2(X ₂)	2(X ₃)
2(X ₁)	4(X ₂)	3(X ₃)
5(X ₁)	2(X ₂)	4(X ₃)
Mean(\bar{X}_1)=2.67	Mean(\bar{X}_2)=2.67	Mean(\bar{X}_3)=3.00

DF within = No of numbers- No of groups

$$= 9 - 3$$

$$= 6$$

DF between = No of groups-1

$$= 3 - 1$$

$$= 2$$

$F_{\text{value}} = \frac{\text{Mean square between}}{\text{Mean square within}}$

*Mean square within = $\frac{\text{sum of square within}}{\text{df within}}$

DF within = No of numbers- No of groups

$$= 9 - 3$$

$$= 6$$

Sum of square total = $\sum (x_1 - \bar{X}_1)^2 + (x_1 - \bar{X}_1)^2 + (X_1 - \bar{X}_1)^2 + (X_2 - \bar{X}_2)^2 + (X_2 - \bar{X}_2)^2 + (X_2 - \bar{X}_2)^2 + (X_3 - \bar{X}_3)^2 + (X_3 - \bar{X}_3)^2 + (X_3 - \bar{X}_3)^2$

sum of square within = $\sum (1 - 2.67)^2 + (2 - 2.67)^2 + (5 - 2.67)^2 + (2 - 2.67)^2 + (4 - 2.67)^2 + (2 - 2.67)^2 + (2 - 3)^2 + (3 - 3)^2 + (4 - 3)^2$

*Mean square between = $\frac{\text{Sum of square between}}{\text{df between}}$

DF between = No of groups-1

$$= 3 - 1$$

$$= 2$$

Sum of square between= sum of square total- sum of square within

Sum of square total= $\sum (x-GM)^2 + (x-GM)^2 + (X-GM)^2 + (X-GM)^2 + (X-GM)^2 + (X-GM)^2 + (X-GM)^2 + (X-GM)^2 + (X-GM)^2$

Sum of square total= $\sum (1-2.78)^2 + (2-2.78)^2 + (5-2.78)^2 + (2-2.78)^2 + (4-2.78)^2 + (2-2.78)^2 + (2-2.78)^2 + (3-2.78)^2 + (4-2.78)^2$

$F_{\text{value}} = \frac{\text{Mean square between}}{\text{Mean square within}}$

$F_{\text{value}} = \frac{0.12}{2.22}$

$F_{\text{calculate}} = 0.05$

$F_{\text{Table}} = 5.14$

	Between (2)
Within (6)	5.14

Note: If $F_{\text{calculate}} > F_{\text{Table}} \longrightarrow$ There is a significant difference

$F_{\text{calculate}} = 0.05 < F_{\text{Table}} = 5.14$