Question : Using the following data, perform a one way analysis of variance using α=.05. Write up

the results in APA format.

[Group1: 51, 45, 33, 45, 67]

[Group2: 23, 43, 23, 43, 45]

[Group3: 56, 76, 74, 87, 56]

Answer :

**Using one way ANOVA, we conduct Hypothesis Testing.**

**N is total number of data points across all groups**

**n is total number of data points within a individual group**

**a is total number of levels of factor**

**N = 15, n = 5, a = 3 and α=.05**

**df-between = a-1 = 3-1 = 2**

**df-within = N-a = 15-3 = 12**

**df-total = N-1 = 15-1 =14**

**Now, we have to calculate as follows:-**

**Group1 Mean : (51+45+33+45+67)/5 = 241/5 = 48.2**

**Group2 Mean: (23+43+23+43+45)/5 = 177/5 = 35.4**

**Group3 Mean: (56+76+74+87+56)/5 = 349/5 = 69.8**

**Group1 Variance = (51-48.2)^2+(45-48.2)^2+(33-48.2)^2+(45-48.2)^2+(67-48.2)^2/5-1 = 612.8/4 = 153.2**

**Group2 Variance = (23-35.4)^2+(43-35.4)^2+(23-35.4)^2+(43-35.4)^2+(45-35.4)^2/5-1 = 515.2/4 = 128.8**

**Group3 Variance = (56-69.8)^2+(76-69.8)^2+(74-69.8)^2+(87-69.8)^2+(56-69.8)^2/5-1 = 732.8/4 = 183.2**

**Mean Square-within = (153.2+128.8+183.2)/3 = 155.07**

**SumofSquares-within = Mean Square-within \* df-within = 155.07\*12 = 1860.8**

**Mean of Group Means = (48.2+35.4+69.8)/3 = 153.4/3 = 51.13**

**Variance of Groups Means = (48.2-51.13)^2+(35.4-51.13)^2+(69.8-51.13)^2/3-1 = 604.58/2 = 302.29**

**Mean Square-between = 302.29\*5 = 1511.45**

**SumofSquares-between = Mean Square-between\* df-between = 1511.45\*2 = 3022.9**

**F = Mean Square-between/Mean Square-within = 1511.45/155.07 = 9.75**

**Referring F table for α=.05, the corresponding value for df-between and df-within is 3.8853 which means if the calculated F is greater than F critical(2,12) i.e- 3.8853 then we reject Null Hypothesis.**

**Inference : Reject Null Hypothesis**