Using the following data, perform a oneway 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]

Solution

**Mean for each group.**

**Group1(mean)=241/5=48.2**

**Group2(mean)=177/5=35.4**

**Group3(mean)=349/5=69.8**

**Intermediate steps in calculating the group variances:**

**Group 1**

|  |  |  |  |
| --- | --- | --- | --- |
| Value | Mean | X1-X | Square(X1-X) |
| 51 | 48.2 | 2.8 | 7.84 |
| 45 | 48.2 | -3.2 | 10.24 |
| 33 | 48.2 | -15.2 | 231.04 |
| 45 | 48.2 | -3.2 | 10.24 |
| 67 | 48.2 | 18.8 | 353.44 |

Group2

|  |  |  |  |
| --- | --- | --- | --- |
| Value | Mean | X1-X | Square(X1-X) |
| 23 | 35.4 | -12.4 | 153.76 |
| 43 | 35.4 | 7.6 | 57.76 |
| 23 | 35.4 | -12.4 | 153.76 |
| 43 | 35.4 | 7.6 | 57.76 |
| 45 | 35.4 | 9.6 | 92.16 |

Group3

|  |  |  |  |
| --- | --- | --- | --- |
| Value | Mean | X1-X | Square(X1-X) |
| 56 | 69.8 | -13.8 | 190.44 |
| 76 | 69.8 | 6.2 | 38.44 |
| 74 | 69.8 | 4.2 | 17.64 |
| 87 | 69.8 | 17.2 | 295.84 |
| 56 | 69.8 | -13.8 | 190.44 |

Variance

Group1=612.8/4=153.2

Group2=512.25/4=128.8

Group3=732.85/4=183.2

MSError=(153.2+128.8+183.2)/3=155.07

dferror=15−3=12

SSerror=(155.07)(15−3)=1860.8

**Combined Group deviations**

|  |  |  |  |
| --- | --- | --- | --- |
| Group Mean | Aggregated Mean | (X1-X) | Square(X1-X) |
| 48.2 | 51.13 | -2.93 | 8.58 |
| 35.4 | 51.13 | -15.73 | 247.43 |
| 69.8 | 51.13 | 18.67 | 348.57 |

Sum of squares (Aggregated)=604.58

Variance (Aggregated)=604.58/2=302.29

**MS(Aggregated)**=(302.29)(5)=1511.45

**dfgroups**=3−1=2

**SS(Aggregated)**=(1511.45)(3−1)=3022.9

**Test statistic and critical value**

**F=1511.45/155.07=9.75**

**Fcritical (2,12)=3.89**

**Decision: reject H0**

| **Source** | **SS** | **df** | **MS** | **F** |
| --- | --- | --- | --- | --- |
| Group | 3022.9 | 2 | 1511.45 | 9.75 |
| Error | 1860.8 | 12 | 155.07 |  |
| Total | 4883.7 |  |  |  |

**Effect size**

**η2=3022.9/4883.7=0.62**

**APA format**

*F*(2, 12)=9.75

*p* <0.05, η2=0.62