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**

Sample means (x) for the groups: = 48.2, 35.4, 69.8

Intermediate steps in calculating the group variances:

Group 1:

value mean deviations sq deviations

1 51 48.2 2.8 7.84

2 45 48.2 -3.2 10.24

3 33 48.2 -15.2 231.04

4 45 48.2 -3.2 10.24

5 67 48.2 18.8 353.44

Group 2:

value mean deviations sq deviations

1 23 35.4 -12.4 153.76

2 43 35.4 7.6 57.76

3 23 35.4 -12.4 153.76

4 43 35.4 7.6 57.76

5 45 35.4 9.6 92.16

Group 3:

value mean deviations sq deviations

1 56 69.8 -13.8 190.44

2 76 69.8 6.2 38.44

3 74 69.8 4.2 17.64

4 87 69.8 17.2 295.84

5 56 69.8 -13.8 190.44

Sum of squared deviations from the mean (SS) for the groups:

612.8 515.2 732.8

Var1 = 612.8 / (5−1) = 153.2

Var2 = 515.2 / (5−1) = 128.8

Var3 = 732.8 / (5−1) = 183.2

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

Calculating the remaining *error* (or *within*) terms for the ANOVA table:

dferror = 15−3 = 12

SSerror = (155.07)(15−3)=1860.8

**Intermediate steps in calculating the variance of the sample means:**

Grand mean (x¯grand) = (48.2+35.4+69.8) / 3 = 51.13

group mean grand mean deviations sq deviations

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 (SSmeans) = 604.58

Var means = 604.58 / (3−1) = 302.29

MSbetween = (302.29) (5) = 1511.45

Calculating the remaining *between* (or *group*) terms of the ANOVA table:

Dfgroups = 3 – 1 = 2

SSgroup = (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**

**ANOVA table**

| **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 writeup**

***F*(2, 12) = 9.75,   *p* <0.05,  η2=0.62.**