**Assignment 19.2**

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]

Sample means (*x*¯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

*Varmeans*=604.583−1=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**

*η*2=3022.9/4883.7=0.62

**APA writeup**

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

η2=0.62.