**Is gender independent of education level? A random sample of 395 people were**

**surveyed and each person was asked to report the highest education level they**

**obtained. The data that resulted from the survey is summarized in the following table:**

**ANS**:

Here's the table of expected counts:

|  | High School | Bachelors | Masters | Ph.d. | Total |
| --- | --- | --- | --- | --- | --- |
| Female | 50.886 | 49.868 | 50.377 | 49.868 | 201 |
| Male | 49.114 | 48.132 | 48.623 | 48.132 | 194 |
| Total | 100 | 98 | 99 | 98 | 395 |

So, working this out, χ2=(60−50.886)2/50.886+⋯+(57−48.132)2/48.132=8.006

The critical value of χ2 with 3 degree of freedom is 7.815. Since 8.006 > 7.815, we reject the null hypothesis and conclude that the education level depends on gender at a 5% level of significance.

**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]**

**ANS:**

[[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

[[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

[[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:

[1] 612.8 515.2 732.8

Var1=612.85−1=153.2Var1=612.85−1=153.2

Var2=515.25−1=128.8Var2=515.25−1=128.8

Var3=732.85−1=183.2Var3=732.85−1=183.2

MSerror=153.2+128.8+183.23=155.07MSerror=153.2+128.8+183.23=155.07

dferror=15−3=12dferror=15−3=12

SSerror=(155.07)(15−3)=1860.8

Grand mean (x¯grandx¯grand) = 48.2+35.4+69.83=51.1348.2+35.4+69.83=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(SSmeans)=604.58

Varmeans=604.583−1=302.29Varmeans=604.583−1=302.29

MSbetween=(302.29)(5)=1511.45MSbetween=(302.29)(5)=1511.45

dfgroups=3−1=2dfgroups=3−1=2

SSgroup=(1511.45)(3−1)=3022.9

F=1511.45155.07=9.75F=1511.45155.07=9.75

Fcritical(2,12)=3.89

So, reject null hypothesis

**Calculate F Test for given 10, 20, 30, 40, 50 and 5,10,15, 20, 25.**

**For 10, 20, 30, 40, 50:**

**ANS:**

Calculate Variance of first set  
  
Total Inputs (N) =(10,20,30,40,50)  
Total Inputs (N)=5  
Mean (xm)= (x1+x1+x2...xn)/N  
Mean (xm)= 150/5  
Means(xm)= 30  
SD=sqrt(1/(N-1)\*((x1-xm)2+(x2-xm)2+..+(xn-xm)2))  
=sqrt(1/(5-1)((10-30)2+(20-30)2+(30-30)2+(40-30)2+(50-30)2))  
=sqrt(1/4((-20)2+(-10)2+(0)2+(10)2+(20)2))  
=sqrt(1/4((400)+(100)+(0)+(100)+(400)))  
=sqrt(250)  
=15.8114  
Variance=SD2  
Variance=15.81142  
Variance=250  
  
Calculate Variance of second set  
For 5, 10,15,20,25:  
Total Inputs(N) =(5,10,15,20,25)  
Total Inputs(N)=5  
Mean (xm)= (x1+x2+x3...xN)/N  
Mean (xm)= 75/5  
Means (xm)= 15  
SD=sqrt(1/(N-1)\*((x1-xm)2+(x2-xm)2+..+(xn-xm)2))  
=sqrt(1/(5-1)((5-15)2+(10-15)2+(15-15)2+(20-15)2+(25-15)2))  
=sqrt(1/4((-10)2+(-5)2+(0)2+(5)2+(10)2))  
=sqrt(1/4((100)+(25)+(0)+(25)+(100)))  
=sqrt(62.5)  
=7.9057  
Variance=SD2  
Variance=7.90572  
Variance=62.5  
  
To calculate F Test  
F Test = (variance of 10, 20,30,40,50) / (variance of 5, 10, 15, 20, 25)  
= 250/62.5  
= 4.  
  
The F Test value is 4.