**Assignment5.1**

**Problem Statement:**

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:

High School Bachelors Masters Ph.d. Total

Female 60 54 46 41 201 Male 40 44 53 57 194 Total 100 98 99 98 395 Question: Are gender and education level dependent at 5% level of significance? In other words, given the data collected above, is there a relationship between the gender of an individual and the level of education that they have obtained?

**Answer:**

Ho: Gender and education are dependent.

H1: Gender and educations are not dependent

The [degrees of freedom](http://stattrek.com/Help/Glossary.aspx?Target=Degrees%20of%20freedom) (DF) is equal to: DF = (r - 1) \* (c - 1)

Here r=2,c=4

DF=1\*3=3

To find expected frequencies.Er,c

= (nr \* nc) / n

E1,1 = (100 \* 201) / 365 = 50.886

E1,2 = (98\* 201) / 365 = 49.868

E1,3 = (99 \* 201) / 365 = 50.377

E1,4 = (98 \* 201) / 365 =49.868

E2,1 = (100 \* 194) / 365 =49.114

E2,2 = (98\* 194) / 365 =48.132

E2,3 = (99\* 194) / 365=48.623

E2,4 = (98 \* 194) / 365 =48.132

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **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 |

Χ2 = Σ [ (Or,c - Er,c)2 / Er,c ]

χ2=(60−50.886)2/50.886+(54 - 49.868)2/49.868+(46 -50.377)2/50.377+(41- 49.868)2/49.868+

(40-49.114)2/49.114 +(44-48.132)2/48.132+(53-48.623 )2/48.623 +(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, therefore we reject the null hypothesis and conclude that the education level depends on gender at a 5% level of significance.