IS606 - Presentation -Chapter 6

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March 23, 2016

In this session we will look at the following problem

> **6.47 Offshore drilling, Part III.** The table below summarizes a data set we first encountered in Exercise 6.29 that examines the responses of a random sample of college graduates and non-graduates on the topic of oil drilling. Complete a chi-square test for these data to check whether there is a statistically significant difference in responses from college graduates and non-graduates.

	College Grad	
	Yes	No
Support	154	132
Oppose	180	126
Do not know	104	131
Total	438	389

Solution:

To check whether there is a statistically significant difference between the Grads and Non-Grads, we form the following hypotheses:

H_0: There is no difference in support between the 2 groups.

H_A: There is a difference in support between the 2 groups.

Lets first calculate the row totals and change the layout of the table.

College Grad	Yes	No	Total
Support	154	132	286
oppose	180	126	306
Do Not Know	104	131	235
Total	438	389	827

Next we calculate the expected count for each cell. The expected count for each cell is calculated with the following formula:

$$\text{Expected count}_{\text{ row i, col j}} = \frac{(row\ i\ total, col\ j\ total)}{(table total)}$$

Using the above formula for each cell, we get the following expected counts table:

College Grad	Yes	No
Support	151.5	134.5
oppose	162.1	143.9
Do Not Know	124.5	110.5

Next we calculate the following formula for each cell:

$$\frac{(Observed count\ i,j\ - expected count\ i,j\ )^2}{(expected count\ i,j)}$$

Using the above formula, we get the following table:

College Grad	Yes	No
Support	0.04	0.05
oppose	1.98	2.23
Do Not Know	3.36	3.79

The chi-square statistic is calculated by summing up all the values in the above table.

The degrees of freedom is calculated using the following formula:

df = (rows - 1) x (cols - 1)

Chi-Square statistic

Thus we have the following values:

$\chi^2 = 4.3$

and

$df = 2$

The p-value for this is 0.1164842

Since this value is higher than 0.05, we fail to reject the null hypotheses

It can be concluded that there is no difference in support between the 2 groups