MA 331 Quiz 2 Theodem Jagodits

I pledge my honor that I have abided by the Stevens honor system.

1. Categorical random variables

variable 1: commercial version → first version, → second version, → third version

variable 2: likelihood to buy a product → likely, → unsure or unlikely

2.

commercial Version	Likely	unsure or unlikely	total
1st version	25	40	65
2nd version	20	10	30
3rd version	54	31	85
total	99	81	180

Likelyhood to by product

3. Expected 2-way table

commercial Version	Likely	unsure or unlikely	total
1st version	35.75	29.25	65
2nd version	16.5	13.5	30
3rd version	46.75	38.25	85
total	99	81	180

4. $\chi^2 = \sum \frac{(\text{observed} - \text{expected})^2}{\text{expected}}$

χ^2	likely	unlikely
version 1	3.2325	3.9509
version 2	0.7424	0.9074
version 3	1.1243	1.3742

$\Rightarrow \chi^2 = 11.3317$

5. The H_0 is that there is no relationship between the commercial version and the likelihood of a potential customer to buy the product.

$$\chi^2 \sim \chi^2_k \text{ with } k = (r-1)(c-1) \quad \chi^2_2 \text{ as } k = (3-1)(2-1)$$

6. $$P_{H_0}\left(\chi^2 > \sum_{i=1}^{r}\sum_{j=1}^{c} \frac{(O_{i,j} - E_{i,j})^2}{E_{i,j}}\right) < \alpha$$

$$P_{H_0}(\chi^2 > 11.3317) = 0.663465$$

$$P_{H_0}(\chi^2 > 11.3317) < \alpha$$

7. If the pvalue is smaller than the significance level α we reject the H_0. Otherwise we fail to accept the H_0 if the pvalue is to large

8. If the pvalue is small we reject the H_0.
So there is an association between the commercial version shown and a potential buyers likelihood of buying a product. If the pvalue is higher than the significance level and we fail to reject the H_0, then we can conclude there is no apparent association between the commercial version shown and the potential buyers likelihood of buying a product.