Week6.ChiSq

March 30, 2020

1 Chi Squared statistics

Null-hypothesis is that there's no connection between independance in family and religion importance amongst adolescents

```
H1RE4      1.0   2.0  3.0  4.0
H1INDCOM
0          996   599   87  322
1         1816  1619  304  750
H1RE4          1.0       2.0       3.0       4.0
H1INDCOM
0         0.354196  0.270063  0.222506  0.300373
1         0.645804  0.729937  0.777494  0.699627
chi-square value, p value, expected counts
(56.7566984613319, 2.8963252577509062e-12, 3, array([[ 867.89588788,
684.56368397,  120.6782689 ,  330.86215925],
       [1944.10411212, 1533.43631603,  270.3217311 ,  741.13784075]]))
```

As p-value is 2.8963252577509062e-12 we can reject Null-hypothesis and conclude that there's dependency in level of religion importance and independance in family. In order to understand, for which types of religion importance variable there's difference we will need to performs 6 pairwise Chi-Squared statustics checks. Taking into account Bonferroni correction we will need to use alpha=$0.05/6 = 0.0083$ as an edge value to reject Null-Hypothesis.

```
COMP1v2    1.0   2.0
H1INDCOM
0          996   599
1         1816  1619
COMP1v2        1.0       2.0
H1INDCOM
0         0.354196  0.270063
1         0.645804  0.729937
chi-square value, p value, expected counts
(40.143849448687504, 2.3593314954877355e-10, 1, array([[ 891.67793241,
703.32206759],
       [1920.32206759, 1514.67793241]]))
```

```
COMP1v3    1.0  3.0
H1INDCOM
0          996   87
```

```
1         1816  304
COMP1v3        1.0       3.0
H1INDCOM
0         0.354196  0.222506
1         0.645804  0.777494
chi-square value, p value, expected counts
(26.015307195668154, 3.387210712293114e-07, 1, array([[ 950.7948798,
132.2051202],
       [1861.2051202,  258.7948798]]))
```

```
COMP1v4    1.0  4.0
H1INDCOM
0          996  322
1         1816  750
COMP1v4        1.0       4.0
H1INDCOM
0         0.354196  0.300373
1         0.645804  0.699627
chi-square value, p value, expected counts
(9.790313808813597, 0.0017543352123602204, 1, array([[ 954.22657055,
363.77342945],
       [1857.77342945,  708.22657055]]))
```

p-value = $0.002 < 0.008$ => Null-hypothesis can be rejected, so there's Families in which Religion is very important motivate their children to be independant significatnyl more often than those for whom religion is not important at all

```
COMP2v3    2.0  3.0
H1INDCOM
0          599   87
1         1619  304
COMP2v3        2.0       3.0
H1INDCOM
0         0.270063  0.222506
1         0.729937  0.777494
chi-square value, p value, expected counts
(3.637607858162325, 0.056488041859543155, 1, array([[ 583.1920276,
102.8079724],
       [1634.8079724,  288.1920276]]))
```

p-value = $0.05 > 0.008$ => Null-hypothesis cannot be rejected, so there's no significant difference between families for whom religion is fairly important and for whom it is fairly unimportant

```
COMP2v4    2.0  4.0
H1INDCOM
0          599  322
1         1619  750
COMP2v4        2.0       4.0
H1INDCOM
0         0.270063  0.300373
```

```
1         0.729937  0.699627
chi-square value, p value, expected counts
(3.1451685460801864, 0.0761521328065757, 1, array([[ 620.90516717,
300.09483283],
       [1597.09483283,  771.90516717]]))
```

p-value = 0.07 > 0.008 => Null-hypothesis cannot be rejected, so there's no significant difference between families for whom religion is fairly important and for whom it is not important at all

```
COMP3v4   3.0  4.0
H1INDCOM
0          87  322
1         304  750
COMP3v4        3.0       4.0
H1INDCOM
0         0.222506  0.300373
1         0.777494  0.699627
chi-square value, p value, expected counts
(8.242656426328717, 0.004091720474394229, 1, array([[109.3089542, 299.6910458],
       [281.6910458, 772.3089542]]))
```

p-value = 0.004 < 0.008 => Null-hypothesis can be rejected, so there's Families in which Religion is fairly unimportant motivate their children to be independant significatnyl more often than those for whom religion is not important at all