Solutions

STAT 217: Quiz 18

1. A random sample of Americans was taken, and each subjects Age - (Under 30, 30-49, 50 and over) and Political Ideology-(Liberal, Moderate, Conservative) were noted.

```
PolAge <- as.table(rbind(c(83,140,73), c(119,280,161), c(88,284,214)))
dimnames(PolAge) <- list(age=c("underthirty","thirtytofortynine","fiftyandOver"),
party=c("Liberal","Moderate", "Conservative"))
PolAge
```

```
##                     party
## age                  Liberal Moderate Conservative
##   underthirty             83      140           73
##   thirtytofortynine      119      280          161
##   fiftyandOver            88      284          214
```

(a) Would this be a test of independence or homogeneity? independence

```
  Pearson's Chi-squared test

data:  PolAge
X-squared = 27.9743, df = , p-value = 1.262e-05
```

(b) Above is the output for the chisquared test. What is your conclusion?

A. There is no evidence of a relationship between age and political ideology(p-value< 0.0001 from Chi-squared-stat=27.9743 on 4 df).

B. There is no evidence of a relationship between age and political ideology(p-value< 0.0001 from Chi-squared-stat=0.1262 on 9 df).

C. There is strong evidence of a relationship between age and political ideology(p-value< 0.0001 from Chi-squared-stat=0.1262 on 9 df).

(D) There is strong evidence of a relationship between age and political ideology(p-value< 0.0001 from Chi-squared-stat=27.9743 on 4 df).

Below is the table of expected counts generated by R. Are all of the assumptions and conditions met for the chi squared test?

```
chisq.test(PolAge)$expected
```

```
##                     party
## age                  Liberal Moderate Conservative
##   underthirty          59.53    144.5        91.96
##   thirtytofortynine   112.62    273.4       173.98
##   fiftyandOver        117.85    286.1       182.06
```

(A) Yes.

B. No, age is not categorical.

C. No, the table of expected counts is too similar to the table of observed counts.

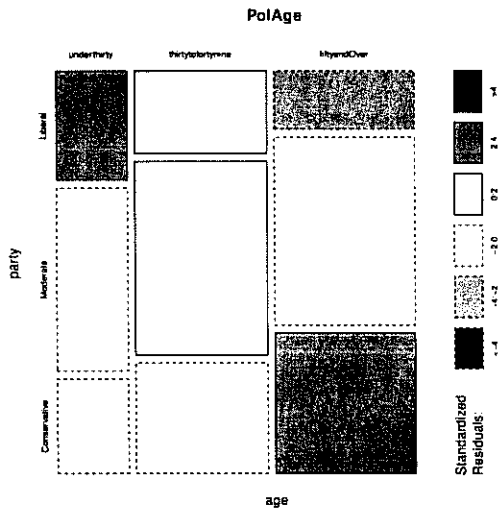
D. No, the normality assumption is not met.

Below is a table and a plot of standardized residuals.

```
chisq.test(PolAge)$residuals
```

```
##                      party
## age                   Liberal Moderate Conservative
##   underthirty          3.0421  -0.3752      -1.9773
##   thirtytofortynine    0.6011   0.3993      -0.9841
##   fiftyandOver        -2.7497  -0.1237       2.3673
```

```
mosaicplot(PolAge,shade=T)
```



(c) The top left segment on the plot is blue. What does this tell us about the Liberal underthirty group? Use the appropriate value from the table of standardized residuals to support your answer.(*Hint: You can also compare the table of expected and observed counts on the previous page*) The standardized residual for this group is 3.0421 which suggests that there are many more counts in the liberal <30 group than we would expect if there is no relationships between age + party affiliations amongst Americans

(d) The top right segment on the plot is red. What does this tell us about the Liberal fifty and Over group? Use the table to support your answer
The std residual is -2.75 which suggests there are much fewer counts in the liberal ≥50 group than we would expect if there was no relationship between age + party,

(e) The bottom middle segment is white with dashed borders. What does this tell us about the Conservative thirty to fortynine group? Use the table to support your answer.
The std residual is -0.9841 which suggests there are slightly fewer counts in the conservative 30-49 age group than we would expect if there was no relationship btwn age & party