Stat 439: Homework 3

Due Thur 2/24/22 by 5pm in D2L

Your name here

Instructions

You are strongly encouraged to use R Markdown to complete your Homework assignments, starting with this file as a template and Knitting to pdf. Submit your homework to Gradescope as a single pdf file.

Part I: Book Exercises

Agresti Exercises 2.16, 2.25, 2.30cde, 3.1

Part II

1.

For this problem, we are going to use data from the 2008 General Social Survey. You can read this data set into R using the following command:

```
gss <- read.csv("http://www.math.montana.edu/shancock/data/GSS-08.csv",
     na.string="")
```

We are interested in the two categorical variables `polparty` (the respondent's political party – Democrat, Republican, Independent, or Other) and `owngun` (does the respondent own a gun? – Yes or No). Note that there are some missing values in this data set. We only want to work with the complete cases for our two variables. Use the following R code to delete observations with missing values for either of these variables:

```
gss <- gss[complete.cases(gss[,c(5,9)]), ]
```

a. Use the R function `xtabs` to create a contingency table with political party as the rows and gun ownership as the columns.
b. Display this set of data (only the two variables of interest) in an appropriate plot. Write a few sentences describing what your graph shows about the relationship between political party and gun ownership.
c. State the null and alternative hypotheses for a chi-squared test of independence for these two variables. State the hypotheses both using mathematical notation, and also in words in context of the problem.
d. Check the assumptions for using chi-squared distribution for a Pearson chi-squared or likelihood ratio test statistic on these data. Clearly explain why the assumptions are or are not met.
e. **Without using the `chisq.test` function**, calculate the estimated expected frequencies under the null hypotheses, the Pearson chi-squared test statistic, and the p-value. (You may use `chisq.test` to check your answer.)
f. Based on the p-value in part d., write a conclusion of the test in context of the problem.
g. Calculate the likelihood ratio chi-squared test statistic and its p-value. Do you reach the same conclusion using this test statistic as you did with the Pearson chi-squared test statistic?
h. Use the `chisq.test` function to calculate the scaled (Pearson) residuals. Write a few sentences describing what these values tell you about the relationship between political party and gun ownership.

Part III: Cite Sources

Write the sources you used to complete this assignment at the end of your homework submission, adhering to the "Guidance on Citing Sources" bullet points in the collaboration policy section on our course syllabus.