STAT 477/STAT 577
HW 4 - Module 2: Sections 1 through 3

1. The Women's Health Initiative conducted a randomized experiment to see if hormone therapy was helpful for post-menopausal women. The women were randomly assigned to receive the estrogen plus progestin hormone therapy or a placebo. After 5 years, the number of women who developed cancer in each group was determined. The data can be found in the **WHI.csv** file in Canvas.

   (a) Obtain a contingency table of the two variables. What proportion of women developed cancer in each group?

   (b) Conduct a hypothesis test to determine if the proportion of women with cancer is different between the two groups.

   (c) Calculate a 90% confidence interval for the difference in the proportion of women with cancer between the hormone therapy group and the placebo group. Interpret this confidence interval.

   (d) Calculate a 90% confidence interval for the relative risk of developing cancer when taking hormone therapy and interpret this confidence interval.

   (e) Calculate a 90% confidence interval for the odds ratio of developing cancer when taking hormone therapy and interpret this confidence interval.

2. On the night of April 14, 1912, the luxury liner *RMW Titanic* hit an iceberg and sank in the North Atlantic Ocean. In the popular movie from 1997 about this disaster, first class passengers appeared to be able to get to the life boats, while third class passengers were kept away. Is there truth to this appearance? Was the proportion of passengers rescued different for each class of ticket? The data containing information about the number of people with each class of ticket, including crew, and whether or not the person was rescued or lost can be found in the **titanic.csv** file in Canvas.

   (a) Obtain a mosaic plot that compares the proportion of passengers rescued among the four ticket classes. Interpret the mosaic plot.

   (b) Conduct a hypothesis test to determine if the proportion of passengers rescued was the same across all ticket classes.

   (c) Determine the pairwise hypothesis tests for the proportion of passengers rescued for the four ticket classes. Which class(es) appear to have a significantly different proportion rescued?

   (d) Was the movie correct: Did the proportion of passengers rescued differ among ticket classes?

3. In 1996, in the General Social Survey of 1,895 adults in the United States conducted by the National Opinion Research Center, respondents were asked about their attitudes towards premarital sex. The question asked was **When is premarital sex wrong?**

and the possible answers were **Always Wrong**, **Almost Always Wrong**, **Sometimes Wrong**, **Not Wrong at All**. People's attitudes about social behaviors tend to be related to other more general background variables about the individual. Among other questions, respondents were asked about one such variable, their religious affiliation. Possible answers were **Catholic**, **Protestant**, **Jewish**, **Other**, **None**. The data can be found in the **GSS.csv** file in Canvas.

(a) Calculate the conditional distribution of attitude towards premarital sex given religious affiliation is Catholic.

(b) Calculate the conditional distribution of attitude towards premarital sex given religious affiliation is Protestant.

(c) Obtain a mosaic plot that compares the attitudes towards premarital sex among the give religious affiliation groups. Interpret the mosaic plot.

(d) Conduct a hypothesis test to determine if attitudes towards premarital sex is the same for all five groups.

(e) In conducting the hypothesis test, you will find at least one of the cells in the table has an expected value less than 5. Identify the cell(s).