

STAT 477/STAT 577

HW 5 - Module 2: Sections 4 and 5

1. The following table of counts was obtained from a random sample of 1397 respondents from the population of adults (more than 18 years old) in the United States in 1982. Each respondent was cross-classified with respect to opinions regarding gun registration as a part of comprehensive gun control legislation (Favor or Oppose) and imposing the death penalty on adults convicted of certain violent acts (Favor or Oppose). The data can be found in the file **poll.csv**.
 - (a) Calculate the contingency table between the two variables.
 - (b) Make a mosaic plot or segmented bar graph of the two variables. Interpret the relationship between the two variables.
 - (c) Conduct a test of independence for the two variables. Use $\alpha = 0.05$.
 - (d) Calculate an estimate of the ϕ correlation for the two variables.
2. The operations manager of a company that manufactures tires wants to determine whether there are any differences in the quality of workmanship among the three daily shifts. She randomly selects 496 tires and carefully inspects them. Each tire is either classified as perfect, satisfactory, or defective, and the shift that produced it is also recorded. The two categorical variables of interest are: shift and condition of the tire produced. The data can be found in the file **tireshift.csv**.
 - (a) Calculate a contingency table between the two variables.
 - (b) Make a mosaic plot or segmented bar graph of the two variables. Interpret the relationship between the two variables.
 - (c) Explain why it is reasonable to conduct a test of independence for these two variables when the shift variable is a grouping variable.
 - (d) Describe a different data collection that would have required the use of a test for the equality of multinomial proportions (Section 2 Part C).
 - (e) Conduct a test of independence for the two variables. Use $\alpha = 0.05$.
 - (f) Calculate an estimate of Cramer's V for this contingency table.
3. In a study of disparities between mother and child perceptions of ability, sixth grade children were asked to rate their own academic ability as either Below Average, Average, or Above Average. The mother of each child was also asked to rate the child's academic ability as either Below Average, Average, or Above Average. The data can be found in the file **ability.csv**.
 - (a) Calculate the contingency table between the two variables. Order the categories for each variable as given above.
 - (b) Make a mosaic plot or segmented bar graph of the two variables. Interpret the relationship between the two variables.

- (c) Calculate a test of independence for the two variables. Use $\alpha = 0.05$.
- (d) Calculate the Goodman-Kruskal Gamma statistic for these data to determine the strength of the directional relationship between the two variables and report its confidence interval. Is there more than random agreement on mother and child perceptions of ability?