**Stat 705 homework 6**

1. **Left-handedness**: In a survey of Scottish and English college students, 40 out of 400 were left-handed. Let $\pi$ be the population proportion of left-handed students. Find and interpret a 95% confidence interval for $\pi$. Recent research estimates the proportion worldwide to be $\pi_0 = 0.11$. Formally test the hypothesis $H_0 : \pi = 0.11$ using these data.

2. **Heart attacks and milk protein**: A medical team investigrated the relation between immunological factors and survival after a heart attack. Blood speciments from 213 male heart-attack patients were tested for presence of antibody to milk protein. The patients were followed to determine whether they lived for 6 months following their heart attack. The results are tabled here:

| | | Antibody response | | |
|---|---|---|---|---|
| | | Positive | Negative | Total |
| Survival | Died | 29 | 10 | 39 |
| | Alive | 80 | 94 | 174 |
| | Total | 109 | 104 | 213 |

   Let $\pi_1$ be the probability of dying among the positive responders and $\pi_2$ be the probability of dying among the negative responders. Be careful how you enter the data in SAS!

   (a) Find an estimate and 95% confidence interval for $\pi_1 - \pi_2$ and interpret. Do we reject $H_0 : \pi_1 = \pi_2$ at the 5% level?

   (b) Find an estimate and 95% confidence interval for the relative risk $\pi_1/\pi_2$. Do we reject that the relative risk is one at the 5% level?

   (c) Find an estimate and 95% confidence interval for the odds ratio of dying (comparing positive to negative responses). Do we reject that the odds ratio is one at the 5% level?

3. **Binge eating**: A group of paitents with a binge-eating disorder were randomly assigned to take either the experimental drug fluvoxamine or a placebo in a nine-week-long double-blind clinical trial. At the end of the trial the condition of each patient was classified into one of four categories: no response, moderate response, marked response, or remission (i.e. from worst to best-case scenarios). The following table cross-classifies the data:

| | No response | Moderate response | Marked response | Remission |
|---|---|---|---|---|
| Fluvoxamine | 15 | 7 | 3 | 15 |
| Placebo | 22 | 7 | 3 | 11 |

Test that the level of response is independent of treatment at the 5% level; report the p-value. If you reject independence, follow up the analysis with a residual analysis as shown in the class notes. Also compute the gamma statistic $\hat{\gamma}$, a confidence interval for $\gamma$, and interpret.