Project 1 **Math 222**
Inference about Proportions **Due Friday, January 27**

1. Using the arbuthnot dataset that we worked with in class, we saw that there were clearly more boys born than girls in 17th century London. Were there any years when the ratio dipped below 50%? Were there any years where the ratio of boys to girls was above 50%, but still not statistically significantly greater than 50% (at the 5% significance level)? Which years does that happen? Use R to find the answer, and explain your computations. Does it make a difference whether you use a binomial distribution or a normal approximation to answer this question? Do both to find out, and report on your results. What does it mean if the gender ratio is statistically significant some years, but not others?

2. Most people are right-handed and even the right eye is dominant for most people. German bio-psychologist Onur Güntürkün (Nature, 2003) conjectured that this preference for the right side manifests itself in other ways as well, so he studied kissing couples to see if both people tended to lean to their right more often than to their left (and if so, how strong the tendency is). He and his researchers observed couples from age 13 to 70 in public places such as airports, train stations, beaches, and parks in the United States, Germany, and Turkey. They were careful not to include couples who were holding objects such as luggage that might have affected which direction they turned. We will assume these couples are representative of the overall decision making process when kissing.

   (a) In a paragraph, identify the individuals, the variable, and statistic in this study. Is the variable quantitative or categorical? Also define the statistic and the parameter in words. What symbols do we use to refer to the statistic and parameter?

   (b) In total, 80 couples leaned right when they kissed, out of the 124 couples that were observed. Is this statistically significant evidence that couples are more likely to lean right? Carry out a complete analysis, including a statement of the hypothesis, and a description of the null model and how it is used.

   (c) Find a confidence interval for the proportion of couples that lean right when they kiss. Explain what method you used to find your confidence interval and why that method is appropriate for this situation.