STAT 380
Assignment 2

1. page 15, number 14. Two players take turns playing a game. Player A starts and has chance p of winning the game immediately. If she doesn't then Player B takes her turn and has chance p of winning. They go back and forth until a player wins; each time the player has chance p of winning. What is the chance that Player A wins?

2. page 80, number 12. The question asks you to find the chance that you get 4 or more right on a 5 question multiple choice test if each question has 3 possibilities, one of which is correct, and you are just guessing every time?

3. page 86, number 32.

   The number of times you win, X, has a Binomial(50,1/100) distribution which is well approximated by the ? distribution.

   (a) $P(X \geq 1) =?$

   (b) $P(X = 1) =?$

   (c) $P(X \geq 2) =?$

4. In baseball and hockey teams play 7 game series against each other in the playoffs; first team to win 4 games wins the series (and then they stop playing). Suppose Team A plays Team B and each time they play the chance that Team A wins is p.

   (a) What is the chance that Team A wins; make a graph of this probability against p?

   (b) What is the chance the series lasts 7 games; make a graph of this probability against p?

   (c) Find a formula for the expected number of games played. Don't bother to try to simplify. Graph the expected value against p.

   (d) Your graph will show you which value of p maximizes the chance that the series lasts 7 games; prove that this value of p is the maximum.

5. page 164, number 8. In this question you roll a die repeatedly. Define X to be the number of rolls needed to get a 6 and Y to be the number needed to get a 5. Find $\mathrm{E}(X)$, $\mathrm{E}[X|Y=1]$, and $\mathrm{E}[X|Y=5]$.

6. page 164, number 11. Random variables X and Y have joint density

$$f(x,y) = \frac{y^2 - x^2}{8} e^{-y} 1(0 \le y < \infty, -y \le x \le y)$$

   Show $\mathrm{E}(X|Y=y) = 0$.

7. page 165 number 15. If X and Y have joint density

$$f(x,y) = \frac{e^{-y}}{y} 1(0 < x < y < \infty)$$

   then find the marginal density of Y, the conditional density of X given Y and $\mathrm{E}(X^2|Y=y)$.