Homework 4

Due April 23, 2014

Please make sure to explain your answers to each of the following questions. Remember: a correct numerical answer without explanation is worth no points! Write up your answers legibly and logically. The not-to-turn-in problems provide additional practice and are important to preparing for exams.

1. Gambler problems: A slot machine has two Double 7's, three Single 7's, two Triple Bar's, two Double Bars and two Single Bars, as well as eleven Blanks on each of three reels (sort of like this). The machine costs $1 to play. The payout is determined by the following table:

Outcome	Payout
All Double 7's	500
All Single 7's	200
All 7's	75
All Triple Bars	40
All Double Bars	20
All Single Bars	10
All Bars	5
All symbols	2

   Assume each of the 22 outcomes is equally likely. What is the expected payout? Is this a reasonable assumption?

2. On a field trip, four buses carry 148 students. The buses carry 40, 33, 25 and 50 students respectively. One of the students is selected at random as is one of the bus drivers. Let X denote the number of students on the chosen student's bus and Y be the number on the chosen driver's bus. Which of $E(X)$ and $E(Y)$ is greater? Explain intuitively why this should be true.

3. Section 6.1 Exercise 31 (a) and (b)

4. Section 6.2 Exercise 9

5. Section 6.2 Exercise 23

6. Gambler's Ruin: You have \$23, and I have \$42. Flip a coin:

   - If it is heads, you give me a dollar.
   - If it is tails, I give you a dollar.

   We play until one of us has all the money (\$65). Using a simulation, estimate the probability I win. Also, estimate how long the game takes. Explain how you obtained your answers.

Problems **not** to turn in (Items with * go beyond practice):

1. Section 6.1 Exercises 1-5 (on Probability Online)
2. Section 6.2 Exercise 4 (on Probability Online)
3. Section 6.2 Exercise 5
4. Section 6.2 Exercise 8 (on Probability Online)
5. Section 6.2 Exercise 12
6. Section 6.1 Exercise 31 part (c)
7. $*$ Try to find an exact solution for the probability you win in Gambler's ruin when you start with $\$k$ and I start with $\$(n-k)$.