COSC 030, Fall 2015: Problem Set #7

Assigned: Thursday, 10/29.
Due: Tuesday, 11/10.
Lectures Covered: Weeks 9 and 10 (Chapters 7.1, 7.2, 7.4).
Academic Integrity: You must work alone on the problem set and not consult outside sources (with the exception of the professor and teaching assistants). See the syllabus for details on the academic integrity policy for problem sets.

Problems

Note #1: When asked to provide a probability you can express the probability as a fraction (e.g., you can say, $9/115$ instead of 0.07826086956).

Note #2: For all problems you must **show your work** to get full credit.

1. Consider a game where I roll two dice and you win if their sum is greater than 9.
   - What is the probability that you win?
   - Assume on one of the two die I scratch out some of the dots on the side showing 6 so that it reads 3. Now what is the probability that you win?
2. Consider a game where I roll six dice and you win if no more than four of the dice roll a one. What is the probability that you win?
3. Assume a game show where you are presented with three closed doors. There is a prize behind one of the doors. You have two choices: (a) open door 1; or (b) open doors 2 and 3. If the prize is behind a door you open, you win the prize. Assume the probability that the prize is behind door 1 is twice as large as the probability that the prize is behind door 2, and the probability that the prize is behind door 2 is twice as large as the probability that the prize is behind door 3.
   - What is the probability that you win the prize if you choose option a from above?
   - What is the probability that you win the prize if you choose option b?
4. I generate a string of 5 bits by flipping a fair coin 5 times (heads = 0 and tails = 1). Given that the first two flips are heads, what is the probability that I end up with a string containing at least three 0's in a row? (To receive full credit you must use conditional probability in calculating your answer.)
5. Consider a gambling game where you roll two dice. If both dice roll the same value, you win $\$10$. Otherwise, you lose $\$1$. What is your expected winnings for this game?
6. Consider a variation of the above game that is defined the same *except* if you roll a 1 on the first die, then regardless of what you roll on the second, you now lose d dollars. Calculate what value for d makes this a "fair" game (i.e., a game where the expected winnings is $\$0$).