

Homework 3 – Due July 18, 2012

Be sure to write your first and last name on your homework. Please write neatly and staple all pages together. You should show all your work!

1. Answer question 19 in the online homework. You are given the file MontyHall.m. Update this file (see the question and comments in the file for more direction) and upload your code. You do not need to hand in anything on paper for this question.
2. (Number 6 from Section 4.1) From a deck of five cards numbered 2,4,6,8, and 10, a card is drawn at random and replaced. This is done three times. What is the probability that the card numbered 2 was drawn exactly two times, given that the sum of the numbers on the three draws is 12?
3.
 - (a) Suppose you roll a loaded die (loaded as in Section 1.2, Exercise 6). What is the expected value of the outcome of the die?
 - (b) Now suppose you roll one loaded die (as in part (a)) and one fair die together. What is the expected total? (By total, I mean if you roll a 3 and a 5, the total is 8.)
 - (c) Now suppose you roll one loaded die (as in part (a)) and one loaded die where even numbers are twice as likely as odd numbers. What is the expected total?
4.
 - (a) (Problem 4 in Section 6.1) In Las Vegas the roulette wheel has a 0 and a 00 and then the numbers 1 to 36 marked on equal slots; the wheel is spun and a ball stops randomly in one slot. When a player bets 1 dollar on a number, he receives 36 dollars if the ball stops on this number, for a net gain of 35 dollars; otherwise, he loses his dollar bet. Find the expected value for his winnings.
 - (b) (Problem 5 in Section 6.1) Half of the numbers 1 to 36 are red and half are black. If a player bets a dollar on black, and if the ball stops on a black number, he gets two dollars, for a net gain of 1 dollar. If the ball stops on a red number or on 0 or 00, he loses his dollar. Find the expected value for this bet.
5. Suppose X is the number of aces in a 5-card poker hand. What is the $E(X)$?
6. (Problem 16 of Section 6.1) Consider the following game. There are six dice. Each of the dice has 5 blank sides. The sixth side has a number between 1 and 6 – a different number of each die. The six dice are rolled and the player wins a prize depending on the total of the numbers which turn up. Find the expected total. (May be helpful to use some properties of expected value.)
7. (Problem 18 of Section 6.1) Exactly one of six similar keys opens a certain door. If you try the keys, one after another, what is the expected number of keys that you will have to try before a success? (Try making a tree. Note that this is done without replacement.)