

Homework 2 – Due July 11, 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 2 in the online homework. You are given the file `coinTosses.m`, which contains the code to generate a vector of n coin flips. 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. (Section 3.2, Problem 12(a),(b),(c)) A poker hand is a set of 5 cards randomly chosen from a deck of 52 cards. Find the probability of a
 - (a) royal flush (ten, jack, queen, king, ace in a single suit)
 - (b) straight flush (five in a sequence in a single suit, but *not* a royal flush)
 - (c) four of a kind (four cards of the same value)
3. For any n and k , we have $k \cdot \binom{n}{k} = n \cdot \binom{n-1}{k-1}$. Show this in the following ways:
 - (a) Plug in the formula for the binomial coefficient and show that both sides are equal algebraically.
 - (b) Argue that each side counts the number of ways of selecting a committee consisting of k people including a distinguished president of the committee, from a group of n people.
4. Which is more likely? (For this problem, you should compute the probability of each and compare them.)
 - (a) When you roll 6 dice, you get *at least* one 6.
 - (b) When you roll 12 dice, you get *at least* two 6's.
 - (c) When you roll 18 dice, you get *at least* three 6's.
5. (Section 4.1, Problem 1) Assume that E and F are two events with positive probabilities. Show that if $P(E|F) = P(E)$, then $P(F|E) = P(F)$.
6. (Section 4.1, Problem 17) Prove that if A and B are independent, so are
 - (a) A and B^c
 - (b) A^c and B^c .
7. (Section 4.1, Problem 22) One coin in a collection of 65 has two heads. The rest are fair. If a coin, chosen at random from the lot and then tossed, turns up heads 6 times in a row, what is the probability that it is the two-headed coin?

Practice Problems (Do not turn in!): 3.2.1, 3.2.8, 3.2.14, 3.2.22, 4.1.3, 4.1.8 (Notice that the answers to the odd numbered questions are online.)