CS330 Homework 7 *

For any problem below where we want you to calculate down to a number or ratio, we'll say so, otherwise it's optional and you can leave the result as an expression, especially if it involves variables (e.g. 1 - C(n, n-1) / P(n, n-1) or 1 - 1/(n-1)!)

1.   Points = 3. What is the probability that a five-card poker hand contains the ace of hearts?

2.   Points = 4. What is the probability that a five-card poker hand contains a flush, that is, five cards of the same suit?

3.   Points = 4. Find the probability of selecting none of the correct six integers in a lottery, where the order in which these integers are selected does not matter, from the positive integers not exceeding

   a.   40   b.   48   c.   56   d.   64

4.   Points = 4. What is the probability that W, X, Y, and Z win the first, second, third and fourth prizes, respectively, in a drawing if 50 people enter a contest and

   a.   No one can win more than one prize.

   b.   Winning more than one prize is allowed.

5.   Points = 6. What is the probability of these events when we randomly select a permutation of $\{1, 2, \ldots, n\}$ where $n \geq 4$?

   a.   1 precedes (is anywhere before) 2.

   b.   2 precedes 1.

   c.   1 immediately precedes 2.

6.   Points = 6. What is the probability of these events when we randomly select a permutation of the 26 lowercase letters of the English alphabet?

   a.   The first 13 letters of the permutation are in alphabetical order.

   b.   a is the first letter of the permutation and z is the last letter.

   c.   a and z are next to each other in the permutation.

7.   Points = 6. Assume that all days of the week are equally likely as birthdays.

   a.   What is the probability that two people chosen at random were born on the same day of the week?

   b.   What is the probability that in a group of n people chosen at random, there are at least two born on the same day of the week?

   c.   How many people chosen at random are needed to make the probability greater than ½ that there are at least two people born on the same day of the week?

8.   Points = 3. We have a lottery where you choose a set of 6 different numbers from 1 through 50. The payout is $10,000,000 if you match all 6 winning numbers, otherwise you win nothing. A ticket costs $1. What are the expected payout and expected profit?

9.   Points = 4. Suppose that we flip a fair coin until either it comes up tails twice or we have flipped it six times. What is the expected number of times we flip the coin?