**ENEE324. Problem set 3**

**Date due** February 24, 2016

Explanations are required, no credit for just the answer.

1. Take four cards without replacement out of a well-shuffled deck of 52 cards. What is the probability that they all have (a) different denominations? (b) different suits? (c) What is the probability that card no. 10 from the top is a Queen? (d) What is the probability that card no 10 is the first Queen among the top 10 cards?

2. A lottery ticket has 6 numbers from one to 36 (all different). The drawing is 6 random numbers out of 36 (also without replacement).

(a) What's the chance of guessing correctly all 6 numbers?

(b) What's the chance of guessing correctly exactly 3 numbers?

(c) What's the chance of guessing correctly at least 3 numbers?

3. Roll a fair 6-sided die 8 times. What is the probability that the outcome of the 8th roll did not appear in the first 7 trials?

4. Select a natural number between 1 and 20000. What is the probability that the sum of its digits is 5?

(Binomial distribution)

5. In a game, you are dealt black or white marbles, one by one. Suppose that the probability of getting a black marble is $p$ in each trial, and that you win if a half or more marbles that you get are black. You can choose whether you stop after 6 or after 4 rounds of the game. Determine for what values of $p$ it is better to play 6 rounds than 4 rounds.

6. In a game, the player flips two coins. He wins \$1 if he gets two heads in succession, otherwise he loses two quarters. If this game is repeated 50 times, what is the probability that the net gain or loss is greater than or equal to: (a) \$1 (b) \$5 ?