

## CS 333202: Probability and Statistics

### HW5 Part II

1. Each game you play is a win with probability  $p$ . You plan to play 5 games, but if you win the fifth game then you will keep on playing until you lose.
  - (a) Find the expected number of games that you play.
  - (b) Find the expected number of games that you lose.
2. A computer network consists of several stations connected by various media (usually cables). There are certain instances when no message is being transmitted. At such “suitable instances,” each station will send a message with probability  $p$ , independently of the other stations. However, if two or more stations send messages, a collision will corrupt the messages, and they will be discarded. These messages will be retransmitted until they reach their destination. If the network consists of  $N$  stations, on average, how many times should a certain station transmit and retransmit a message until it reaches its destination?
3. A pipe-smoking mathematician carries, at all times, 2 matchboxes, 1 in his left-hand pocket and 1 in his right-hand pocket. Each time he needs a match he is equally likely to take it from either pocket. Consider the moment when the mathematician first discovers that one of his matchboxes is empty. If it is assumed that both matchboxes initially contained  $N$  matches, what is the probability that there are exactly  $k$  matches in the other box,  $k = 0, 1, \dots, N$ ?