EE381 Homework #7

1) Using binomial distribution, find the probability that in tossing a fair coin three times, there will appear:
   a) 3 heads
   b) 2 tails and 1 head
   c) At least 1 head
   d) Not more than 1 tail
2) If 20% of the bolts produced by a machine are defective, determine the probability that out of 4 bolts chosen at random, (a) 1, (b) 0, (c) less than 2, bolts will be defective.
3) A box contains 6 blue marbles and 4 red marbles. An experiment is performed in which a marble is chosen at random and its color observed, but the marble is not replaced. Find the probability that after 5 trials of the experiment, 3 blue marbles will have been chosen.
4) Find the probability of (a) 2 or more heads, (b) fewer than 4 heads, in a single toss of 6 fair coins.
5) Out of 800 families with 5 children each, how many would you expect to have
   a) 3 boys
   b) 5 girls
   c) Either 2 or 3 boys

   Assume equal probabilities for boys and girls.
6) Find the probability of guessing correctly at least 6 of the 10 answers on a true-false examination.
7) A box contains a very large number of red, white, blue, and yellow marbles in the ratio 4:3:2:1. Find the probability that in 10 drawings, 8 red and 2 yellow marbles will be drawn.
8) Out of 60 applicants to a university, 40 are from the East. If 20 applicants are to be selected at random, find the probability that
   a) 10 will be from the East
   b) Not more than 2 will be from the East
9) Prove that when N is large number, the hypergeometric distribution is identical with binomial distribution.
   Hint: You need to prove that equations (*) and (**) (on slide 21 of lecture 7) are equivalent with the equations for binomial distribution when N is a large number.

Note: Your answers should show your step-by-step work. Answers which have only final results are not accepted.