Lab 3

1. Tom is playing a game on the Price is Right. He is given 4 tags with prices on them. There are 4 items. In order to win an item, he must place the correct tag on the item.
   (a) How many ways can he arrange the tags?
   (b) If he is given 5 tags, how many ways can he arrange the tags?
   (c) If he is given 5 tags and there are only 3 items, how many ways can he arrange the tags?

2. A meeting is held with 8 individuals. If each person shakes hands with another person only once, how many handshakes occurred at the meeting?

3. A secretary types four letters (a,b,c,d) and their respective envelopes (A,B,C,D). Suppose that the letters are put randomly into the envelopes, one letter in each envelope.
   (a) How many outcomes are there?
   (b) List the outcomes of the event A that exactly three letters end up in the wrong envelopes.
   (c) Find P(A)

4. A small advertising firm consists of 2 men and 1 woman. The firm has two clients who are particularly difficult to deal with. To decide who sees the first client, one person is randomly selected from the three. The same procedure is followed for the second client. Note: It may help to write out the sample space.
   (a) Find the probability that both clients are served by the same person from the advertising firm.
   (b) Find the probability that both clients are served by men.
   (c) Find the probability that the events of (a) and (b) occur simultaneously.

5. Bob bought a used cell phone from a friend but forgot to ask what the 4 number password was to unlock it. What's the probability that Bob guesses the correct password on the first try?

6. Find the probability of winning the jackpot for Lotto 649 (you pick 6 numbers from 49 and you can't pick the same number more than once) if you bought one ticket containing one set of numbers.

7. Find the probability of winning the jackpot for Super 7 (you pick 7 numbers from 49 and you can't pick the same number more than once) if you bought one ticket containing 3 different sets of numbers. Are your chances of winning higher for Super 7 with 3 numbers or Lotto 649 with 1 set of numbers?

8. A meeting is attended by 10 doctors, 7 psychologist and 3 psychiatrists.
   (a) Find the number of ways that they can
      (i) elect a president
      (ii) elect 2 representatives
      (iii) elect 2 representatives where one is president and the other VP
      (iv) elect 2 representatives that are doctors

(v) elect 2 representatives (1 doctor and 1 psychologist)
(vi) elect 3 representatives (1 doctor, 1 psychologist and 1 psychiatrist)
(vii) elect 4 representatives (2 doctors, 1 psychologist and 1 psychiatrist)
(viii) elect 4 representatives where there is a president, VP, secretary, and accountant and where 2 of the positions have to be filled by a doctor and the other two by a psychologist and psychiatrist.

(b) Find the probability of questions (iv) through (viii) in questions (A)

9. Prove that C(10,4) = C(9,3) + C(9,4)

10. Two standard dice are rolled simultaneously. Find the probabilities of the following events:
    (a) the sum of the dice is an even number
    (b) the sum of the dice is at least 8
    (c) the sum of the dice is not greater than 9

11. You roll two dice. Let i denote the smaller of the two numbers appearing on the two dice. Determine the probability distribution of i,

12. An urn contains 8 white balls and 4 red balls. Three balls are selected at random from the urn.
(a) Find the probability distribution of the number of red balls chosen in the sample.
(b) Based on the probability distribution, what is the probability that less than 2 red balls will be chosen out of the urn?

All the questions in chapter 2 and all the questions in chapter 3 (except for questions dealing with section 3.5).