1) How many integers, greater than 999 but not greater than 4000, can be formed with the digits 0, 1, 2, 3 and 4, if repetition of digits is allowed?

2) There are 2 brothers among a group of 10 persons. They are going to be arranged around a circle so that there is exactly one person between the two brothers.
   a) In how many ways to select a person to be seated in between the brothers?
   b) In how many ways to arranged all of them around the circle?
   c) In how many ways to arrange the group around a circle so that there is exactly one person between the two brothers?

3) How many ways are there to arrange four subjects and six periods in a day if two subjects are taught in two periods and remaining two periods for another two different subject.

4) In a sport day five kids enter the 100 meter race. How many ways are there if
   a) No ties
   b) Two of them are ties
   c) Two group of two kids ties
   d) Three kids tie with each other

5) District education office provides 10 buses to transport 350 school children for national day event in Kuala Lumpur. Each bus has 45 seats. Show that
   a) One of the buses will have 10 empty seats
   b) One of the buses will carry at least 35 passengers

6) There are 12 chairs in a row and 9 people sitting (so that 9 chairs are occupied and 3 chairs are free). Prove that there are 3 consecutive chairs occupied.

7) Given any integers from 1 to 10, show that some two integers have odd sum.

8) Consider the set of numbers

$$A=\{2,3,4,5,6,7,8,9,10,11,12,13\}$$

Prove that if you pick 7 number from A, then you can always find two of them who's sum is exactly15.

9) Six microprocessors are randomly selected from a lot of 100 microprocessors among which 10 are defective. Find the probability of obtaining
   a) no defective microprocessor
   b) at least one defective microprocessor
   c) at most three defective microprocessors

10) Suppose that a professional wrestler is selected at random among 90 wrestlers, where 35 are over 150kg, 20 are bad guys, and 15 are over 150kg and bad guys. What is the probability that the wrestlers selected is over 150kg or a bad guy?

11) On the weekend at a shopping mall, 65% of the customers buy lunch. Of those who buy lunch, 20% also buy ice cream for a dessert. Of those who do not buy lunch, 55% buy ice cream for a dessert. What is the probability that a randomly selected customer
   a) does not buy ice cream, given that the customer does not buy lunch?
   b) buys ice cream? (*Hint:* $B = (B \cap A) \cup (B \cap A')$)

   Let   A: set of customers who buy lunch
              B: set of customers who buy ice cream

12) There are two bags (Type A and Type B) containing 25 lily flower bulbs. ¾ of Type A bag containing bulbs for 5 red and 20 yellow lily flowers; ¼ of Type B bag contain bulbs for 15 red and 10 yellow lily flowers. A bag is selected at random and one bulb is planted.
   a) What is the probability that the bulb will produce a red lily flower?
   b) What is the probability that the bulb will produce a yellow lily flower?

c) If the lily flower is red, what is the probability it came from Type B bag?