(1) A student club has 30 members. Four three person committees have to be chosen. How many possibilities are there if
   (a) The same person can not serve in the first and second committee (but there are no restrictions about joint membership in other committees)
   (b) If for each pair of committees there should be a unique person (the liaison) serving on those two committees and each person should serve on exactly two committees.

(2) A school has 5 classes with 20 students each. How many four different student committees are possible if
   (a) All students need to be from different classes
   (b) The students can be chosen from the same class but at least two classes need to be represented?

(3) Four numbers are chosen from the set \{1, 2, 3, 4, 5, 6, 7, 8, 9\} (the order is important).
   (a) Find the probability that 2 is chosen.
   (b) Find the probability that both 2 and 3 are chosen and 2 is chosen before 3 is chosen.

(4) Ann, Boris, Cecilia, Doug, Elaine, Fatima and Gary are seated randomly at a round table. Find the probability that
   (a) Boris sits next to either Ann or Cecilia
   (b) All women sit together.

(5) 4 balls are chosen at random from a box containing 3 red, 4 blue and 5 green balls. Find the probability that at least one red and and at least one blue ball are chosen if the balls are taken
   (a) without replacement
   (b) with replacement.

(6) Among the viewers of a certain TV channel 11 % watch volleyball, 13% watch soccer, 15% watch boxing, 21% watch soccer or volleyball, 5% watch soccer and boxing, 22% watch volleyball or boxing and 28% watch at least one of the above sports. Which percentage of the viewers watches
   (a) boxing only
   (b) all three sports.

(7) A coin is tossed six times.
   (a) Find the probability that the among first four tosses there will be at least one tail.
   (b) Find the probability that there will be four heads in a raw.
(8) In bridge a player is dealt 13 cards out of the standard 52 card deck. We call the hand strong in a certain suit if the player has both ace and king in that suit.
   (a) Find the probability that the hand is strong in diamonds.
   (b) Find the probability that the hand is strong in at least one suit.

(9) There are two coins. The first one is fair while the second lands on head 60 percent of the time. One coin is selected at random and tossed two times.
   (a) Find the probability that 2 heads appear;
   (b) If two heads had appeared, what is the probability that the next toss will be head?

(10) To check for a certain illness two tests are used. If the person is ill the first test gives positive result 99% of times but it gives false positive 10% of times. The second test gives positive result 90% of times when the person is ill and it gives a false positive 3% of times. It is known that 10% of patients have the illness.
   (a) Suppose only one test is performed and comes positive. In which case the patient is more likely to be ill: if they took test 1 or test 2?
   (b) Suppose that the outcomes of two tests are independent. If both tests come positive how likely the patient to be ill?

(11) Three balls are drawn from three urns. The first urn contains 1 blue and 5 red balls, the second urn contains 2 blue and 4 red balls, and the third urn contains 3 red and 3 green balls.
   (a) Find the probability that 2 red balls are chosen;
   (b) Let $X$ be the number of different colors chosen. Find the probability that $X = 3$. 