MAT 2155: PROBLEM SET 2

1. Number of rearrangements of the word $\mathrm{SESQUIPEDALIAN}$.
2. Number of anagrams of the word $\mathrm{INDEPENDENCE}$ which
   (i) start with the letter C.
   (ii) all the vowels occur together.
   (iii) no two vowels occur together.
   (iv) begin in I and end in E.
3. Number of positive integers less than 1000 that have distinct digits.
4. Number of ways of choosing 4 cards from a pack of 52 playing cards
   (i) with no restrictions.
   (ii) with all four cards from the same suit.
   (iii) with all four cards from different suits.
   (iv) such that all four cards are face cards.
   (v) such that 2 are red and 2 are black.
   (vi) such that all four cards are of the same colour.
5. There are 9 different books on a bookshelf, 4 red and 5 green. In how many different ways can the books be arranged if
   (i) there are no restrictions?
   (ii) the red books must be together, and the green books must be together?
   (iii) the red books must be together?
   (iv) no two books of the same colour must be together?
6. A shop sells six different flavours of ice cream. In how many ways can a customer choose 4 ice cream cones
   (i) all of different flavours?
   (ii) not necessarily of different flavours?
   (iii) of 2 or 3 different flavours?
   (iv) exactly 3 different flavours?
7. Number of ways of buying a total of 7 fruits from a shop selling apples, oranges, and strawberries, if you must buy at least one fruit of each type.

8. Number of ways of selecting 10 marbles from a pile of red, blue, and green marbles if there must be
   (i) at least 5 red marbles.
   (ii) at most 5 red marbles.
9. Number of integer solutions of the equation $x_1 + x_2 + x_3 + x_4 = 18$ with
   (i) $x_i \geq 0$, $i = 1, 2, 3, 4$.
   (ii) $x_i \geq 1$, $i = 1, 2, 3, 4$.
   (iii) $x_i \geq i$, $i = 1, 2, 3, 4$.
10. Number of binary sequences of length 10 consisting of a run of 1s followed by a run of 0s followed by a run of 1s followed by another run of 0s.
11. Number of ways to distribute 15 identical objects into 4 different boxes such that the number of objects in the fourth box is a multiple of 3.