CSD2259 Tutorial 8

Problem 1. 13 people on a softball team show up for a game.
(a) How many ways are there to choose 10 players to take the field?
(b) How many ways are there to assign the 10 positions by selecting players from the 13 people who show up?
(c) Of the 13 people who show up, 3 are women. How many ways are there to choose 10 players to take the field if at least one of these players must be a woman?

Problem 2. Suppose that a department contains 10 men and 10 women.
(a) How many ways are there to form a committee with 6 members if it must have the same number of men and women?
(b) How many ways are there to form a committee with 6 members if it must have more women than men?
(c) (This part has no relation to a,b) How many ways are there to arrange these 20 people in a row if the men and women are alternate?

Problem 3. Consider the set
$$S = \{1, 2, 3\}$$
(a) List all 2-permutations with repetition allowed of S.
(b) List all 2-combinations with repetition allowed of S.
(c) List all 3-combinations with repetition allowed of S.
(d) List all 4-combinations with repetition allowed of S.

Problem 4. A croissant shop has plain croissants, cherry croissants, chocolate croissants, almond croissants, apple croissants, and broccoli croissants. How many ways are there to choose
(a) a dozen croissants?
(b) three dozen croissants?
(c) two dozen croissants with at least two of each kind?
(d) two dozen croissants with no more than two broccoli croissants?
(e) two dozen croissants with at least five chocolate croissants and at least three almond croissants?

Hints and Instructions

1b. Choosing 10 positions can be done in 10 steps: choose the 1st position, choose the 2nd position, ..., choose the 10th position. For each step, you need to see how many choices are there. Then use the product rule to get the answer.

1c. There are 3 possibilities for the team: 1 woman+ 9 men, 2 women+8 men, 3 women+7 men.

2a. You need to have 3 men and 3 women.

2b. There are 3 possibilities for the committee of 6 members: 4 women and 2 men, 5 women and 1 man, 6 women.

2c. Let red denote the men and blue denote the women. Two possible arrangements are
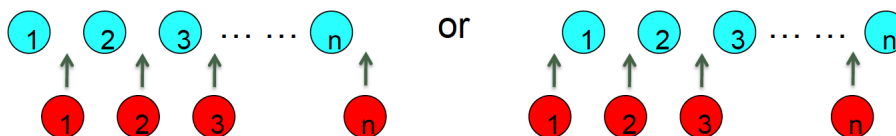
4. These are combinations with repetition allowed of the set S containing 6 types of croissants

$$S=\{\text{plain, cherry , chocolate , almond, apple, broccoli}\}$$