Problem Set 3

Statistics - NYU, Summer 2016
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Section 1

[1] Decide whether each of the following problems involves a permutation or a combination and then work out the answer.

a) How many 4 digit numbers can be made from the digits 2,3,5,6,7 and 9 if no repetition of digits is allowed.

b) A student has to answer 8 out of 10 questions in an exam. How many different choices has she?

c) How many different car number plates can be made if each plate contains 3 different letters followed by 3 distinct digits?

d) How many ways are there of playing a game of lotto requiring you to select 6 correct numbers out of 44?

[2] There are 4 books on fairy tales, 5 novels and 3 plays. In how many ways can you arrange these so that

a) books on fairy tales are together, novels are together and plays are together and in the order from left to right, books on fairy tales, novels and plays.

b) the books on fairy tales are together, novels are together and plays are together, but we no longer require that they should be in a specific order.

[3] A jury of 12 members is to be selected from a panel consisting of 8 men and 8 women.

a) How many different jury selections are possible?

b) In how many different cases a majority of the jury members will be women?

[4] From the first 20 positive integers, in how many different ways three distinct integers can be chosen at random such that

a) their sum is even

b) their product is even

[5] A coin is to be tossed until a heads appears twice in a row.

a) Write the sample space for this experiment? *(Sample space is huge here, so it is enough if you just list some of the elements of the sample space)*

b) Suppose that you know that this experiment has ended after the fourth coin toss. Write the event that describes this situation.

c) Suppose that you know that this experiment has lasted at most four rounds (i.e. at most four coin tosses). Write the event that describes this situation.

d) Suppose that you know that this experiment has lasted at least three and at most five rounds (both bounds are inclusive). Write the event that describes this situation.

[6] Consider the following experiment: Two friends are playing a dart game in which there are 3 possible scores (1,2,3).

a) Suppose each player uses its own dart board and at each round they throw darts simultaneously, and then they write their scores down. They play two rounds. Write the sample space for this experiment.

b) Give two examples of events from this experiment.

c) Now suppose that the game ends in the first round only if *one of the players (so not both)* scores 3, and in all the other cases the game goes to the second round as before. Write the sample space for this experiment.

[7] A bowl contains 16 chips, of which 6 are red, 7 are white, and 3 are blue. In how many different ways, four chips can be drawn without replacement such that

a) all of the four chips are red.

b) none of the four chips is red.

c) there is at least one chip of each color.

Section 2

[8] Consider the following experiment: Tossing a coin until a Heads comes.

a) Describe the sample space

b) Specify the event that you obtain at most two tails.

[9] In how many ways can 4 girls and 5 boys be arranged in a row so that all the four girls are together?

[10] An exam paper consists of 10 questions divided into two parts A and B, each part containing five questions. A candidate is required to attempt six questions in all of which at least 2 should be from part A and at least 2 from part B. In how many ways can the candidate select the questions?

[11] A committee of 5 persons is to be formed from 6 men and 4 women. In how many ways can this be done when

a) at least 2 women are included?

b) at most 2 women are included?

[12] From 5 consonants and 4 vowels, how many words can be formed using 3 consonants and 2 vowels?

[13] The English alphabet has 5 vowels and 21 consonants. What is the maximum number of words, that can be formed from the alphabet with 2 different vowels and 3 different consonants?

[14] In a school annual day function a variety programs was organized. It was planned that there would be 3 short plays, 6 recitals and 4 dance programs. However, the chief guest invited for the function took much longer time than expected to finish his speech. To finish in time, it was decided that only 2 short plays, 4 recitals and 3 dance programs would be performed. How many choices were available to them

a) if the programs can be performed in any order ?

b) if the programs of the same kind were performed at a stretch?

c) if the programs of the same kind were performed at a stretch and considering the order of performance of the programs of the same kind?