Probability and Statistics
Set no. 2
combinatorics, classical definition of probability, conditional probability,
Chavalier de Mere problem

1. How many possible 6-digit phone numbers can be formed if the digits cannot be repeated ?

2. How many possible 6-digit phone numbers can be formed if the digits can be repeated ?

3. How many 2-ditit numbers can be formed ?

4. How many ways do we have to order 6 people in a queue ?

5. There are 10 people. In how many ways 5-people queue can be formed ?

6. How many 7-digit numbers can be formed if the digits cannot be repeated and one assumes that first three are odd and subsequent four are even ?

7. Four girls and six boys are sitting on a bench. The girls sit next to each other and the boys also sit next to each other. How many different ways are there to seat these people according to this rule?

8. Please find the number of six-digit natural numbers that contain the digit "0" exactly three times and the digit "2" exactly once

9. Please calculate the number of four-digit natural numbers with the sum of the digits equal to 3.

10. A group of people consists of 10 women and 8 men. In how many ways can we choose a five-person delegation from this group, if it includes:

   a) at least one woman,
   b) exactly two women,
   c) no more than three women?

11. Let's toss the coin 5 times. After each, one writes down the result: T (tails), H (heads) e.g. THTHH. How many possible sequences can be obtained in such a way ?

12. In a class there are 10 girls and 14 boys. In how many ways can we choose a group of 2 girls and 4 boys ?

13. In how many ways 2 students can be chosen from 30-people class ?

14. The space of elementary events a_i is defined in the following way: $\Omega = \{a_1, a_2, a_3, a_4, a_5\}$. Let's discuss: A = $\{a_1, a_3, a_5\}$ and B = $\{a_2, a_3, a_4\}$. Find the expressions for: A∪B, A∩B, A\B, B\A.

15. What is the probability of obtaining even number of spots in a single dice toss? What is the probability of obtaining the number of spots larger than 4?

16. What is the probability of winning in a popular Polish game Toto-Lotek ? The game is about choosing 6 numbers from the set (1,2, …. 49). One wins some money if three, four, five or six numbers were betted correctly.

17. In a box there are 10 balls (3 white and 7 black). Mr X chooses 1 ball and keeps it. Next he chooses another ball. What is the probability that the second ball is black assuming that the first ball chosen is white ?

18. What is the probability of drawing lots 2 aces from deck of cards as we choose twice without putting the card back ?

19. There are 3 boxes with 10 elements in each. The first box contains 8 standard elements, the second box has 7 standard elements and the third box 9. Mr X chooses randomly one element from each box. What is the probability of choosing 3 standard elements ?

20. The aircraft has 3 engines. The probability that the first engine will break after n hours of flight is equal to 0.0001. For the second and the third engine this probability is: 0.0012 and 0.0002, respectively. Let's assume that the engines do not affect each other. What is the probability that one engine will break during n hours of flight ?

21. Two gamblers A and B agree to play a certain sequence of sets. The winner is the one who will be the first to gain 6 sets. Assume that A wins 4 times and B wins 3 times. How to share the stake if the game is interrupted and has to be finished at this stage ?