

Probability and Statistics

Set no. 3

total probability, Bernoulli scheme and others

1. In a computer store there are disks coming from 3 different factories (I, II and III) and the number coming from each of them is the same. It is well known that some of the disks break and that is: 0.5% from I; 0.7% from II and 1% from III.
 - a) What is the probability that the random disk will break ?
 - b) What is the probability of the following situation: if the disk breaks, it comes from the factory II?
2. One of the disease affects 0.01% of population. There is a test for that disease which gives positive result in the case of 90% of sick people, but also in the case of 5% of healthy people. What is the probability that the healthy man will obtain positive result ? Is this test reliable ?
3. There are 3 devices and one of them is slightly broken. If we use the good device then the probability of the mistake during the measurement is 0.03, in the case of the broken device it increases to 0.3. What is the probability that the measurement performed with the randomly chosen device:
 - a) is wrong (there is a mistake)
 - b) was done with the broken device if its result was wrong ?
4. The probability of hitting the target in a one shot is equal to 0.75. Mr X makes 6 independent shots. What is the probability that the target is reached:
 - a) exactly 1 time
 - b) 0 times
 - c) at least 1 time
 - d) no more than 1 time
5. Let's imagine that someone rolls 2 dices. What is the probability of:
 - a) obtaining the sum of spots > 10 ;
 - b) obtaining the number of spots equal to 2 only on one of them?
6. There are 8 questions on the exam. Each of them has 4 answers and only 1 is correct. What is the probability of passing the exam, as one chooses the answers randomly, if it is required to obtain at least half of the points ?
7. The oral exam contains: 15 questions from algebra, 15 questions from geometry and N statistics' questions. One of the questions was removed from the set and afterwards one was chosen. The task is to find N, if we know that the probability of choosing the question from statistics is equal to $1/4$.
8. On the basis of banks' statistics it appears that 12% of the borrowers lose their job and stop repaying credits within 5 years. Moreover, it is known that 20% of the borrowers lose their job within 5 years. Let's assume that the borrower Smith lost his job. What is the probability that he would stop repaying his credit ?