Probability Theory and Statistics
FOR IT PROGRAMMER STUDENTS

Tutorial 3. - 26th September 2019

24. We throw 3 dice at the same time. What is the probability of one of them being 6, if we know that the sum of the three is 12?

25. Four people are shooting to a target. Their respective chance to hit the target are: $\frac{3}{4}$, $\frac{1}{2}$, $\frac{2}{3}$ and$\frac{1}{2}$. Knowing that only two of them hit the target, what is the probability that the second one missed?

26. Suppose you play the following game: You can try to shoot a balloon as many times as you have thrown 6 with a die consecutively. (For example if your outcomes are 6-6-6-1, you can shoot 3 times, if your first outcome is 3, you cannot shoot) What is the probability that you hit the balloon, if 1 of 1000 shoots is successful?

27. Suppose that 15 people gets in the elevator on the ground floor of a 10-storey building. Each person gets out of the elevator independently from the others on any floor uniformly random. What is the probability of stopping of the elevator on every floor?

28. We throw 2 dice at once. Let X be the random variable representing the sum of the two outcomes and Y their products. What is the distribution of X and Y? What is the expected value of X and Y?

29. We flip a fair coin 6 times. Let X be the random variable denoting the number of tails we get. What is the distribution and the expected value of X?

30. We throw a die and then flip a coin as many times as the number we got on the die. What is the expected number of the tails we get?

31. On another planet every family has 6 kids. The probability of a kid being a boy or a girl is always 50-50%. What is the distribution and the expected value of the number of the boys in a family?

32. The distribution of a random variable X is Poisson with $\lambda = 4$. What is the probability of X being less then 3?

33. You write two tests a semester at this class. Both tests will have 5 problems, each of them are worth 10 points. The first test is easier, the average student can solve each problem with probability 0.8. The second one is more difficult, here the average student can solve each problem with probability 0.4. What is the expected value of the final score of an average student?

34.* The probability of 2 people jumping in the Danube a year is 3 times as much as 5 people jumping in the Danube a year. What is the probability of at most 1 person jumping in the Danube?

35. `[HW]` Suppose that a shooter hits the target with probability $\frac{1}{7}$. Let random variable X mean the number of shoots until the 5th successful hit. Describe the distribution of X!

36. `[HW]` In a raffle game there are 3 different prizes, they are worth 100$, 500$ and 1000$. The organizers sell 100 tickets for the game. What is the highest price that you are willing to pay for a ticket, assuming that you want the expected value of your winning to be more than the amount you payed to enter the game?