

MDS
Probability theory
seminar 2

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Problem 1. Assume that we have a box with 5 white balls and 4 black balls. We take 3 random balls from the box. Let X be the number of white balls taken. Write probability distribution of X .

Problem 2. During the transmission of a message each symbol is distorted with probability 0.1. A message consisting of 5 symbols is send.

1. What is the probability that no symbols will be distorted?
2. What is the probability that there will be at least two distorted symbols?
3. What is the probability that there will be more non-distorted symbols than distorted ones?

Problem 3. In the evening restaurant accepts only guests who made a reservation beforehand. The owner knows that 10% of people who made a reservation, ultimately don't come. The restaurant has 28 tables and the owner received 30 reservations. Calculate the probability that there will be a problem - the number of clients that made a reservation and came will be greater than the number of tables.

Problem 4. Complete the table if we know that $\mathbb{E}X = 0$

Problem 5. We toss 2 dice independently. Let X be the sum of points on them. Find probability distribution of X and $\mathbb{E}X$.

Problem 6. Complete the table if $\mathbb{E}X = 0$, $Var(X) = 5.4$.

Problem 7. In a lottery you choose a three-digit number from 000 to 999. If you guess one digit (for example, the winning number is 366 and your number is 436, then you guessed only the right digit) – you get 5 dollars. If you guessed two digits you get 50 dollars, if you guessed all three digits you get 500 dollars. Let X be a random variable - your payoff in the lottery. Construct a pmf for X and write it in tabular form. Calculate an expected payoff and answer the question: how much should a lottery ticket cost?