

Probability Theory and Statistics
FOR COMPUTER SCIENCE

Tutorial 1. - 12th September 2019

1. We toss a single coin. If the result is heads, then we toss once more, else twice.
 - (a) Identify the sample space, Ω , which describes the experiment.
 - (b) How large is the probability that we get exactly one heads?
2. What is the probability of having all different digits in a randomly chosen 6 digit number?
3. In how many ways can 8 rooks (towers) be placed on a chess table with the proviso that none of any two chessman can take each other?
4. There are 4 indistinguishable balls to be allocated in 7 boxes. Assume that no one gets more than one unit.
 - (a) How many ways are there for box 1 to have one ball?
 - (b) How many ways are there for box 1 and 2 to have a ball each?
 - (c) How many ways are there for the combined allocation to box 1 and 2 to have at least one ball?
 - (d) Assuming that a ball is placed to any given box with equal probability, what are the probabilities of the events in the previous three questions?
5. We draw 3 cards with replacement from a pack of French playing cards (52). How large is the probability that we get (a) exactly (b) at least one Hearts?
6. There are 10 pairs of shoes in a bag. If we randomly pick 4 pieces of shoes, what is the probability of getting a matching pair, if the pairs are
 - a) uniform?
 - b) different?
7. Let A, B, C be three events. Using set-theoretic operations, describe the event that
 - a) exactly k
 - b) at most kevents occur ($k = 1, 2, 3$).
8. Let us throw two dices simultaneously 36 times. How large is the probability that the 36 experiments result at least once a double 6?
9. Suppose that there are N people in the classroom, and each person picks a number between 1 and $(\frac{N}{2})^2$. How large is the probability that there is a number occurring (a) at least, (b) exactly twice?
10. We randomly draw 3 cards from a pack of French playing cards without replacement. What is the probability of getting at least 2 Clubs?
11. The licence plates of cars in Arithmetia are 6 digit numbers between 000000 and 999999 (each used). How large is the probability that
 - a. each digit is the same,
 - b. there is exactly two matching digitson a randomly chosen licence plate?
12. [HW] We place n balls into n boxes in the way that any of them can get into any of the boxes (as well all of them into one single box). How large is the probability that all of the boxes get a ball? And how large is the probability that exactly one box will be left empty?
13. [HW] Suppose a class containing 23 students. How large is the probability that there are 2 people having the same birthdays?