

LECTURE 1-2: EXERCISES

PROBABILITY SPACE & RANDOM VARIABLE

- (1) Describe the probability space (S, F, P) for the following problems:
 - (a) From the set C of k identical elements we choose only one element.
 - (b) From the set C of k *numbered* elements we choose only one element. Let k ($k = 1, \dots, n$) denotes the number of elements we choose from.
 - (c) Let t ($t = 0, \dots, 45$) denote a number of minutes which a student is late for a lecture. Let us assume that we have 100 students.
 - (d) We throw 4 sided dice 3 times.
 - (i) we have the information only about second throw.
 - (ii) we have an information only about: was the sum of throws bigger then 5.
- (2) Give two different examples of random variable for each case of ex. 1.

COUNTING OBJECTS (REPETITION)

- (1) What are permutations? How they are use in combinatorics/probability calculus? Give three intuitive examples.
- (2) What are combinations? How they are use in combinatorics/probability calculus? Give three intuitive examples.
- (3) From the box containing $k = 4$ ($k = 1, \dots, 4$) *numbered* balls we choose randomly 2 balls. Let us:
 - (a) A will be an event of choosing balls for which the sum of numbers is smaller then 5
 - (b) B will be an event of choosing balls for which the sum of numbers is bigger then 4
 - (c) C will be an event for which at least one is bigger then 1Give the probability of $P(A), P(B), P(C)$ (hint: combinations).
- (4) Numbers $1, 2, \dots, n$ were put in the random order. Find the probability of having sequence $1, 2, 3$ in the resulting series.
- (5) The elevator with 7 passangers is stopping on 10 levels. What is the probability that none of the passangers will leave the elevator on the same level?
- (6) The kid is playing with bricks with letters (A,A,A,A,A,B,B,C,D,R,R). What is the probability that it will form the word: ABRACADABRA?
- (7) A 20 person group in which there is 6 women got 5 tickets (same). The tickets are given to people by chance, and each person can receive only one ticket. What is the probability that exactly 3 women would get a ticket?
- (8) There is a filled cube made from white material. We paint its sides with black. Then we devide it into 1000 smaller cubes (using 27 planes parallel to the particular walls of the cube). Now we choose at random one cube. Calculate the probability that the chosen cube:
 - (a) has all sides white,
 - (b) has two sides black,

(c) has one side black.