

# Probability theory and mathematical statistics

## Excercises 4.

1. A dice is rolled. What is the probability distribution of the rolled number? Find the cumulative distribution function (cdf), the expected value and the standard deviation of the rolled number.
2. Suppose that a pair of fair dice are to be tossed and let the random variable  $X$  denote the sum of the points. Obtain the probability distribution and the cumulative distribution function for  $X$ .
3. Two dice are rolled. What is the distribution of the distance of the numbers obtained? What is the probability of the distance being greater than 2 but not greater than 4?
4. An examination question consists of two parts,  $A$  and  $B$ , and the probability of a student getting part  $A$  correct is  $\frac{2}{3}$ . If he gets  $A$  correct, the probability of getting  $B$  correct is  $\frac{3}{4}$ , otherwise it is  $\frac{1}{6}$ . There are three points for a correct solution to part  $A$ , two points for part  $B$ , and a bonus point if both parts are correct. Calculate the expected value and variance of the students' total number of points.
5. A coin is tossed. If the result is a head, it is tossed one more time, otherwise it is tossed two more times. What is the expected value and standard deviation of the number of heads obtained?
6. Peter rolls a dice. If the result is odd, he loses 1 dollar, if it is six, he wins 4 dollars, otherwise he can roll again. If the second roll is even he wins 1 dollar, otherwise he loses 2 dollars. Find out whether this game is advantageous, fair or disadvantageous for Peter. What is the variance of Peter's gain?