

1 Project – submit your solution to tereza.kovarova@vsb.cz

Combinatorics

- 1.1. A new series of Euro banknotes have serial numbers consisting of 8 digits and one letter in certain order. All banknotes of this series start with the digit 4 or 5 and if the first digit is a 5, then the letter is the last symbol of the banknote serial number. Each serial number contains exactly one or exactly two digits 7. At most how many different banknotes can be in this series? (2 b)
- 1.2. In each round we roll an ordinary six-sided dice. We move a peg forward along a line of fields depending on how many points appear on the dice. If a single point is rolled, we do not move the peg forward, but one field back. If two points are rolled, we do not move the peg, but roll the dice twice more and move the peg forward according to the sum of the two outcomes. And if another two is rolled, we do not roll again, yet if a 1 is rolled again, we move one field back for each 1 rolled. What is the expected number of fields we move the peg during one round? (3 b)

Graph Theory

- 1.3. From the graph K_6 we remove three certain edges. How many different non-isomorphic graphs can we obtain? Explain! (2 b)
- 1.4. A leaf is every vertex of degree 1 in a tree. In a tree T there are k non-leaf vertices of degree 3 and l non-leaf vertices of degree 4, where $k, l > 0$. One vertex is of degree 7 and there are no more non-leaf vertices in T . How many leaves are in the tree T ? And how many edges are in T ? (3 b)

Guidelines

Write the project using a computer, include the title with your name, student ID, number of the project, year and a grading table (see the sample project). The project will contain a detailed description of your solution for each problem. Show your work by explaining the steps carefully. If you skip a problem, mark it clearly in the text by saying „*I did not solve the problem number X*“.

Submit your project to tereza.kovarova@vsb.cz as an uncompressed PDF file, use your student ID in the name of your submitted file.

You will be awarded 0 upto 2 or 0 upto 3 points for each of the problems.

Submit your project no later than on **Monday December 10th 2018 at 23:59**.