

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

Combinatorics

- 5.1. In a parking lot, there are 26 automobiles parked in a row of which are : 6 white, 5 blue, 3 red, 3 black, 3 green, 2 yellow, 2 purple, 1 gray, 1 mottled. In how many ways can these cars be parked in the row so that no two white cars, neither two red cars, nor a white and a red car are parked next to each other? (2 b)
- 5.2. In his safe, Mr. Scrooge McDuck shovels his money there and back. There are many billions of one-crown, two-crown, five-crown, ten-crown, and 50-crown coins in the safe and more such coins are still being added. There are no coins of other then mentioned values.

Mr. Scrooge noticed that when loading his shovel, heavier coins have greater chance to be loaded: 50-crown coin's chance is two times greater than ten-crown coin's chance and three times greater than five-crown coin's chance. Further ten-crown coin has two times greater chance than two-crown coin and three times greater chance than one-crown coin. What is the average value of coins loaded on the shovel, if Mr. Scrooge loaded 86 coins. (3 b)

Graph Theory

- 5.3. Suppose a graph G has n vertices and k components. Of course, $n \geq k$. At least, how many edges has to be added to G , so that G is (surely) connected. Justifie your answer in detail. (2 b)
- 5.4. Suppose we have a rooted tree (T, r) with assigned code K . Explain (describe algorithmic procedure) how to obtain a degree sequence of the tree T from the code K without constructing (drawing) the tree. (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 9th 2019 at 23:59**.