

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

Combinatorics

- 4.1. The management of KORPL company has to arrange new equipment for a production hall. They plan to buy five large and four small CNC milling machines (MM). After preliminary market search, the management decided to buy machines from two manufacturers VOLTARE and INAXES. Among products of manufacturer VOLTARE are milling machines of type S for milling small products (small MM), milling machines of type M for medium sized products (medium MM), and of type L for large products (large MM). From manufacturer INAXES management admits to buy milling machines from the type HMC for small products (small MM) or from the type KMC for products of larger dimensions (large MM). In how many ways can the management set up the purchase of machines if they consider milling machines of type M from VOLTARE manufacturer to be universal (they can serve as small as well as large MM), however they admit to purchase at most two machines of this M type. (3 b)
- 4.2. A project manager is managing a project with a team of five employees. To complete the project he needs to assign nine tasks among employees.
- In how many ways can he assign the nine tasks among the five employees so that each employee is assigned at least one task?
 - In how many ways can he assign the nine tasks among the five employees so that each employee is assigned at least one task and at the same time the most difficult task is assigned to Michael (the most experienced employee).

(2 b)

Graph Theory

- 4.3. Use Havel-Hakimi theorem to find three nonisomorphic graphs with degree sequence $(6, 3, 3, 3, 3, 3, 2)$. Give valid arguments to show that the graphs you have found are not isomorphic. (3 b)
- 4.4. Find all nonisomorphic connected graphs on five vertices with at most five edges. Can you find each of these graphs as an induced subgraph in Petersen graph? If a graph is an induced subgraph depict it in the Petersen graph. If a graph is not an induced subgraph of Petersen graph give valid arguments why not. (2 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**.