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

Combinatorics

6.1. Calculate in how many ways can 4 married couples be seated at a round table if at least one man and his wife sit next to each other. (Hint: Use inclusion-exclusion principle.) (3 b)

6.2. If the game Tic-Tac-Toe ended by the seventh round, compute the number of all possibilites how the array could had been filled. Justify properly you result. Do not distingush the order in which the symbols were filled into the array, consider only the resulting positions of the symbols of both players at the end of the game. (If you are not familiar with the rules of Tic-Tac-Toe, you can find it for inst. here: `https://www.exploratorium.edu/brain_explorer/tictactoe.html`) (2 b)

Graph Theory

6.3. Consider a graph G with the degree sequence $(6, 2, 2, 1, 1, 1, 1, 1, 1)$, that is obtained by unifying the vertex of degree 5 of $K_{1,5}$ with the end vertex of P_4. Explain why such a graph G can not be obtained via construction implied by the Havel-Hakimi theorem. (3 b)

6.4. Find on the Internet the definition of a tripartite complete graph $K_{m,n,p}$. Then, determine for what values of parameters $m, n, p \geq 1$ is $K_{m,n,p}$ Eulerian graph. Justify your answer in detail. (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 uncompresed 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**.