

1 Project – submit your solution to petr.kovar@vsb.cz

If you speak Czech, please submit the project to odevzdavarna.gjjhzk0.

Combinatorics

- 1.1. The coach of a football team builds the basic formation 4 – 4 – 2 (besides goalkeeper, four defenders, four midfielders and two forwards). He has available 3 goalkeepers, 7 defenders, 6 midfielders (two are foreign players) and 5 forwards (two are foreign players). In how many can he set up the formation, if not more than two foreign players can be in the basic formation at the same time? The distribution to left and right parts of the field in defense, midfield and attack we do not distinguish. (3 b)
- 1.2. Let M be the set of all binary relations on set $A = \{x, y, z\}$, that are simultaneously reflexive and symmetric.
 1. Find and list all the elements of M .
 2. Draw the Hasse diagram of the sets in M with the inclusion (\subseteq) relation.

(2 b)

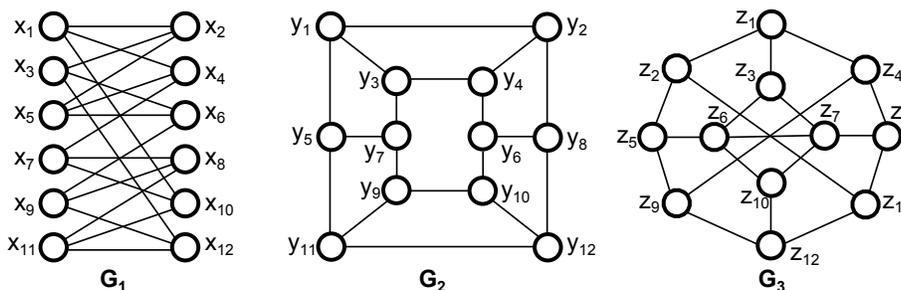
Graph Theory

- 1.3. Set $U = \{462, 1763, 2021, 3127, 3315, 3599, 4370, 4757, 5183, 8323, 14993, 21359, 32147, 47101, 62123\}$ can represent a graph. Elements of U represent vertices of the graph G . We join two vertices x and y in G by an edge in x and y have a common integer divisors larger than 1. Is the graph G Eulerian? Explain! If graph G is not Eulerian, then add to G the smallest possible number of edges so, that graph G' becomes Eulerian.

Hint: you use the first 21 prime numbers to construct graph G .

(3 b)

- 1.4. Determine which pairs of graphs G_1 , G_2 , and G_3 are isomorphic. For isomorphic pairs find and describe the isomorphism. For pairs that are not isomorphic, explain why they are not isomorphic. (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. 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 petr.kovar@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 7.12.2015 at 23:59**.