11 Project (bonus) – submit your solution to `petr.kovar@vsb.cz`

Combinatorics

11.1. When entering digit passwords on a touch screen, fingerprints make it easier for intruders to guess the password, since one can focus on the sequences containing those digits, that are used most – based to the fingerprints.

a) Suppose the password has four digits. How to choose the password so that even with the knowledge of digits that appear in the password there would be as many different orderings of these digits as possible?

b) How will the task change for three- or five-digit passwords?

(5 b, exceptionally 10 b)

Graph Theory

11.2. We have a deck of 52 cards (2–10, J, Q, K, A in four different suits) and we distribute them randomly into thirteen piles with four cards in each pile. Show that it is always possible to pick one card from each pile so that among the thirteen chosen cards there is one card for each value (2–10, J, Q, K, A).

How will the solution change if we distribute the 52 cards into twelve piles of four or five cards each and we want to choose one card from each of the twelve piles to obtain twelve distinct values?

Explain carefully! (5 b, exceptionally 10 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 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 8.12.2014 at 23:59**.