First problem set

Due date: 2019.02.14, 9.00

Topic: simple genetic algorithms

You have to send your solutions via email (evolalghf@gmail.com). You have to solve the problems alone, expect the problems marked * which can be solved in pairs. You can get maximum 10 points.

1. (3+4 points) Let us suppose, that the run-time of an algorithm is monotone increasing in n, which is the length of the input. Investigate the following statements:

   a, If we plot the run-time on log-log scale than we obtain a monoton increasing function.

   b, If the run-time is not only monotone increasing, but also convex, then the plot on log-log scale will be convex.

   Prove the true statement(s) and give counterexample(s) to the false one(s).

2. (3 points) Let us suppose, that two possible solution are coded with 0101010 and 0001000. If they are the parents can any of their offspring be

   - 0101010
   - 1111111
   - 0000000

   in case we use

   - onepoint-crossover?
   - multiplepoints-crossover?
   - uniform-crossover?

3. * (10 points) How can we represent with a fixed length 0-1 series the solutions of the following problem?
   We have an $n \times n$ sized grid, and on each edge a real positive number. We are looking for a path from the upper left corner point to the lower right point, which goes only to the right or down, where the sum of the numbers along the path is minimal. Write a program (using your favorite programming language) to solve this problem using a suitable genetic algorithm.