COMP417 Artificial Intelligence
Exercise Set 1

Pantourakis Michail AM 2015030185
School of Electrical and Computer Engineering
Technical University of Crete

19 March 2018

Exercise 1

Part A

Part B

Exercise 2

Part A

Part B

Part C

Exercise 3

The solution is given in Figure 1.

Exercise 4

Part A

Since only one state ($k = 1$) is stored in memory after each iteration, it is iteratively succeeded by its best neighboring state like in hill climbing. Hence, the local beam search algorithm with $k = 1$ is a simple hill climbing algorithm.

Part B

With temperature $T = 0$, we can say that the probability $e^{\Delta E/T} = 0$ when $\Delta E \leq 0$, namely only better neighboring solutions are accepted. Therefore, simulated annealing with $T = 0$ is a first choice hill climbing algorithm.

Part C

If $N = 1$, the population will consist of a single individual. Crossover will thus happen between (two copies of) that individual, resulting in the exact same solution. The random mutation mechanism will introduce a small number of point changes during each iteration, consequently turning genetic algorithm into a random walk.

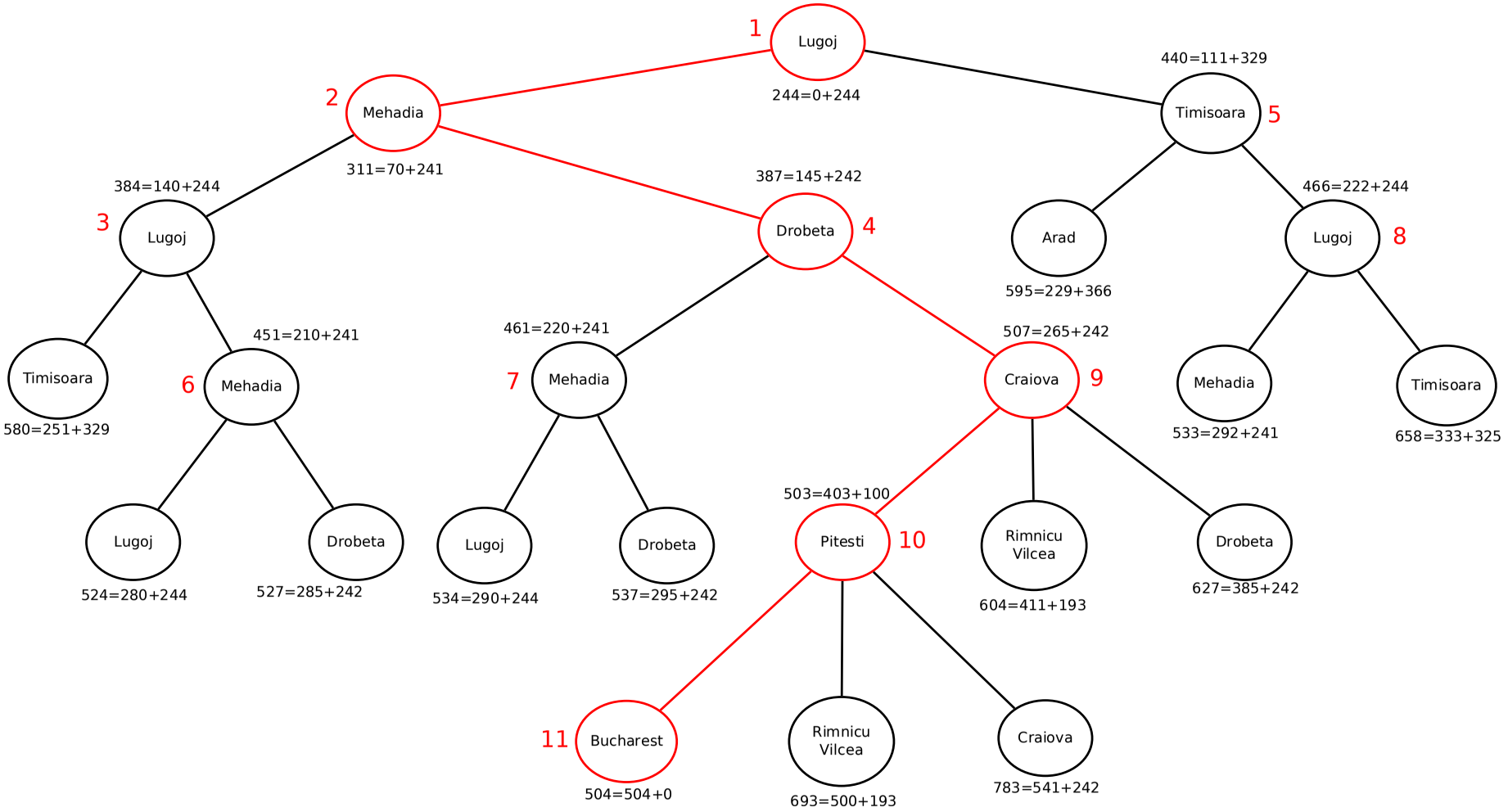

Figure 1: Stages in an A* search from Lugoj to Bucharest. Nodes are labeled with $f = g + h$ (black font), and with the selected order of expansion (red font). Having a sequence of states during each iteration, the algorithm expands the node with the lowest value of f, replacing it in the sequence with all its successors (to be considered for the following iteration). The optimal solution is depicted with red nodes and edges.