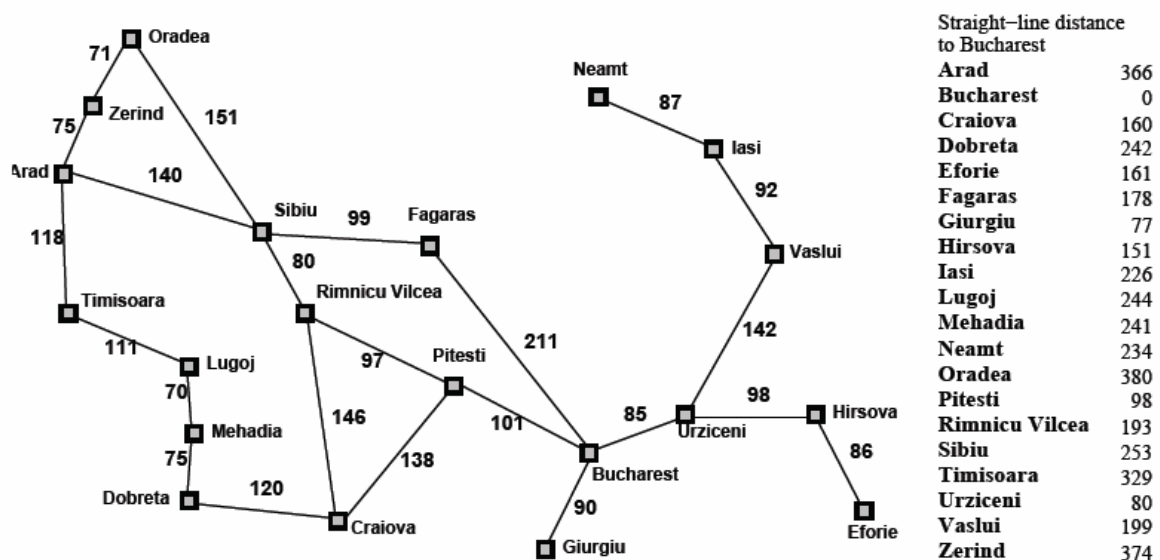# Übungsblatt 3

Abgabe: Dienstag, 15.05.07 bis 13 Uhr

Exercise 1   Informed Search   (20 Points)

a) [5 pts.] Define in your own words the concepts of: uninformed search and informed search.

b) Consider the problem of getting to Bucharest from Lugoj using the straight-line distance heuristic as shown in the figure below.
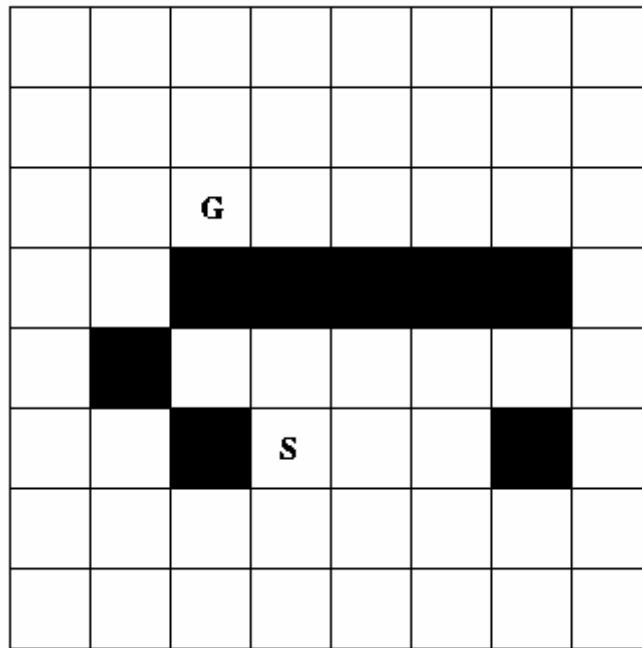

1. [7 pts.] **Greedy Best-First Search**
Show the sequence of nodes that the algorithm will consider.

2. [8 pts.] **A* Search**
The same of 1.b.1 including the *f* (evaluation function), *cost* and *h* (heuristic) score for each node.

Exercise 2   Informed Search, Repeated States   (20 Points)

Given the grid shown below, you want to find a path from the starting square **S** to the goal square **G**. Possible actions are to move up, left, right, and down exactly one square. No move onto a dark square (i.e., obstacles) or off the edge of the grid is allowed.

a) [10 pts.] **Greedy Best-First Search**

Mark the grid squares with the number(s) indicating when that square is expanded during a Greedy Best-First search from S to G. Use as the heuristic function $h(n) = |x_n - x_g| + |y_n - y_g|$ where the grid square associated with node n is at coordinates (x_n, y_n) in the grid and the goal node G is at coordinates (x_g, y_g). Assume you do not generate a node if that node's associated grid position has previously been generated (avoiding repeated states). In the case of ties in evaluation function values, for siblings expand them in the precedence order up, left, right, down. In the case of ties between non-siblings, use FIFO order to expand first the node that has been in the NODES list the longest. Highlight the solution path found, if any, or explain why none is found.

b) [10 pts.] **A* Search**

Do the same as in (2.a) but use A* search. Consider the same heuristic function and tie-breaking rules as in (2.a), and assume the cost of each move equal to 1.