

## Assignment 2

### Topic ‘Uninformed Search’

**Problem 1** Assume you decided to solve the 8-puzzle by means of uninformed search. Consider all algorithms from the set of slides 2012-10-03 and discuss which one you find best suited.

### Topic ‘Informed Search’

**Problem 2** Consider the following search problem. The state space is  $\mathbb{N}_0 = \{0, 1, 2, \dots\}$ , the only goal state is 0. There are three actions called  $M$ ,  $D_2$  and  $D_3$ , each with cost 1. The action  $M$  can always be applied. The result of applying  $M$  to a state  $s$  is  $s - 1$  if  $s - 1$  is even and  $2s - 1$  otherwise. The action  $D_2$  can be applied to a state  $s$  if  $s$  is even. The result of applying  $D_2$  to a state  $s$  is  $s/2$  if  $s/2$  is even and  $s - 1$  otherwise. The action  $D_3$  can be applied to a state  $s$  if  $s$  can be divided by 3. The result of applying  $D_3$  to a state  $s$  is  $s/3$  if  $s/3$  is even and  $(2s/3) - 1$  otherwise.

1. Starting with the initial state 15 use A\* search with  $h(s) = s$  as heuristic function to solve the problem. Draw the search tree that is computed and write next to each state in which step the state was created. Label each edge with the corresponding action.
2. Prove whether or not  $h$  is consistent. Prove whether or not  $h$  is admissible.

### Problem 3 Implementation Task

Implement A\* search. (The implementation from Assignment 1 may be a useful starting point.) Test your implementation on the 8-puzzle with the starting point given below. Use any heuristics that you like. How many moves do you need to solve the puzzle? What is the number of states your algorithm considered? What was the running time?

1	5	2
4	8	3
7	6	

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Assignments are handed out on each Friday during the lecture. Written solutions are due the next Wednesday. Feedback is given and solutions are discussed the Wednesday after that.