INF 4130 Exercise to A*-search Sept 2014

Exercise 1
Solve exercise 23.6 from the text book (B&P).

Exercise 2
Solve exercise 23.7 from the text book.

Exercise 3
Solve exercise 23.8 from the text book.

Exercise 4
Is your answer regarding monotonicity in 23.7 also valid if we allow moving the hole diagonally?

Exercise 5
Is it possible to use the actual cost as our heuristic (it is after all 100% exact and should be good)? Will the actual cost always be monotone? Will we expand a smaller tree? What would the problem be, if any?

Exercise 6
Show that the straight line (actually the circumference of a great circle, but let's not get into details) between a point and the goal point is a monotone heuristic for finding the shortest path the way it is done in chapter 23.3.3 (page 728).

Exercise 7
Assign g-, h- and f-values to the states in figure 23.7 (page 727) and check that we actually avoid expanding the full breadth-first-tree in figure 23.3 (page 719).

Exercise 8

Adjust the DFS procedure below to instead do iterative deepening with one extra level at a time. You should only check once for each node whether it is a goal node, and you need an extra parameter to the procedure DFS. Show how the procedure should be called from a "main" program/procedure for the whole thing to work properly

```
proc DFS(v) {
   if <v is a goal node> then return "…" fi
   v.visited = TRUE
     for <each neighbor w of v> do
         if not w.visited then DFS(w) fi
   od od
```

Exercise 9

Study the example on slide 20 from 12/9 (page 723 on the textbook) to confirm that when $h(v)$ is not monotone, then nodes sometimes will have to be taken back from tree to the priority queue, thus increasing execution time.

Exercise 10

Study the program for the A*-algorithm given on slide 26 from September 16.

[end]