Tutorial 3:
Uninformed and Informed Search

Name	Student no.

For this tutorial, you can work in groups of 1 or 2. Submit the answers to each of the 3 Questions.

The idea of the Questions 1 and 2 is not to try and solve the puzzle, but to determine how to use your representations from Tutorial 2 to define heuristics for an informed search algorithm to use to solve the puzzle. Your group will choose (or be assigned) one of the three problems below.

Question 1

Define two possible heuristic functions for the states in the problem. The heuristic functions do not need to be (and should not be) perfect; their goal is to provide guidance to the search algorithm to help find the solution.

1.

2.

Question 2

Explain why you have chosen particular heuristic functions and where they are likely to fail.

1.

2.

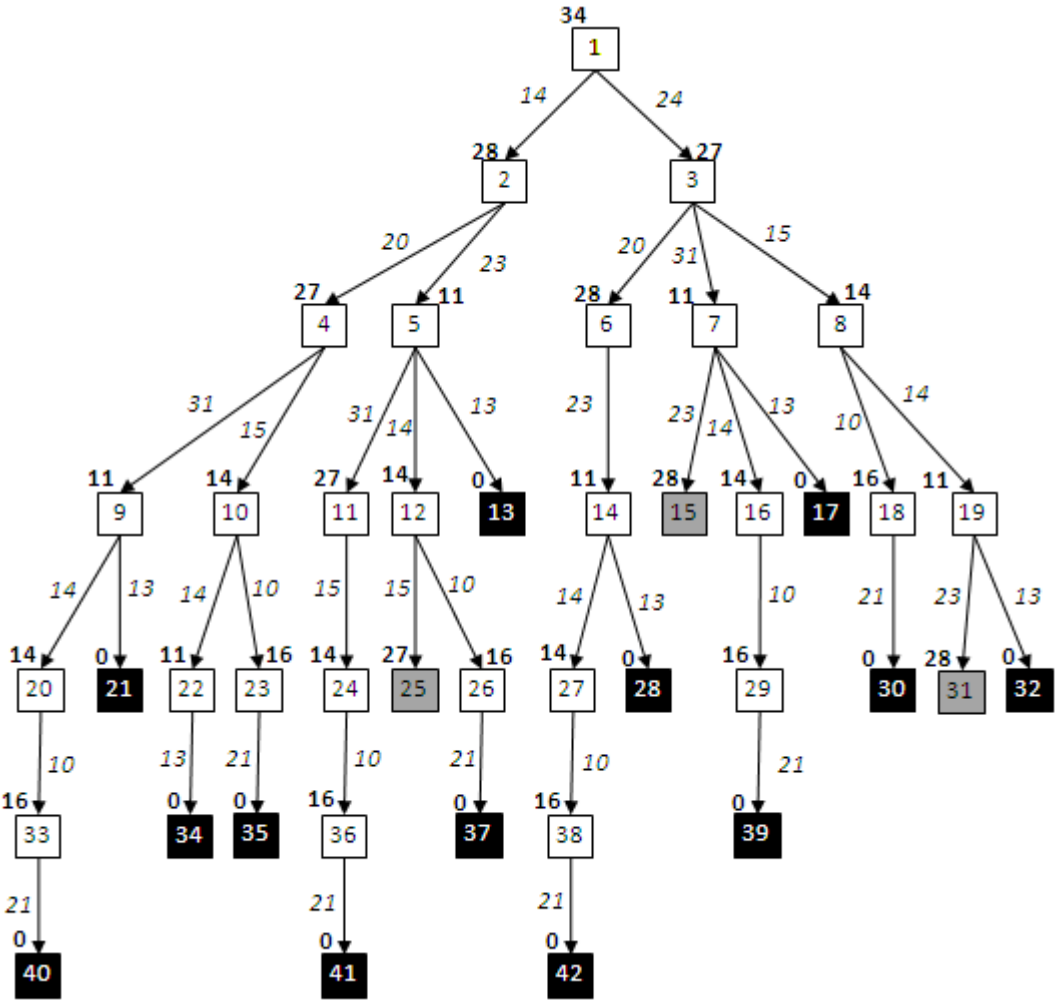
Question 3

For the following tree, trace the workings of a) a Greedy and b) an A* search algorithm. Your tracing should show the state of each node and the order that nodes are visited.

For the chosen path, list the nodes that are visited in order.

In the tree:

- Node 1 is the initial state
- Black nodes are goal states
- Grey nodes are dead ends
- Numbers in bold are the result of the heuristic function at that node
- Numbers in italics are the path cost between nodes.



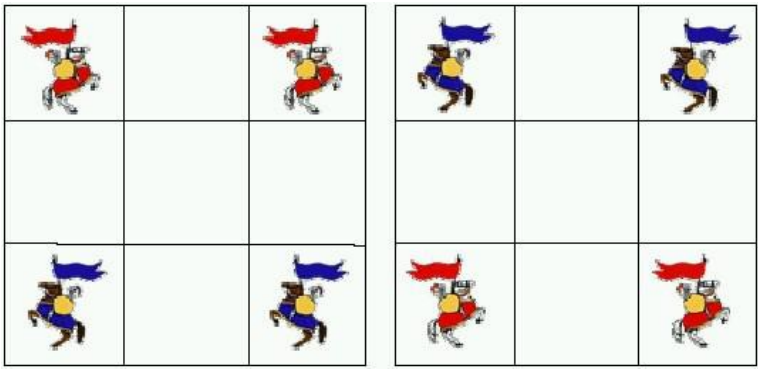
a)

b)

The puzzles available are:

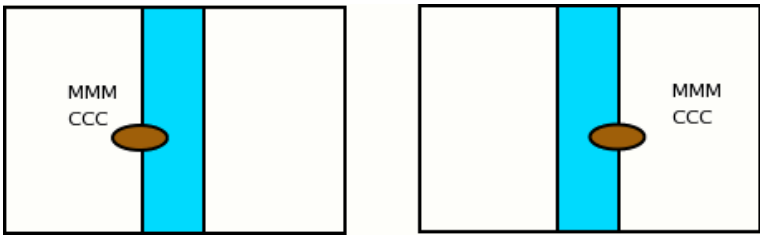
i. *Exchanging the knights:*

Two red knights and two blue knights are placed at the opposite corners of this portion of a chessboard. The blue and red knights need to exchange places (as shown below) by moving according to the rules of chess.



ii. *Missionaries and Cannibals:*

There are three missionaries and three cannibals on one side of a river and they need to get to the other side. There is a two-person boat that can be used to ferry people across. At least one person is needed to row the boat across the river (back and forth) and the cannibals can never outnumber the missionaries on either side of the river.



iii. *Towers of Hanoi:*

There are three pegs and three different sized discs. The discs must move from the first peg to the third peg by moving one disc at a time. A larger disc cannot be placed on top of a smaller disc.