Homework 2

CS5100 Fountains of Artificial Intelligence

Question 1: (8 Marks : 2 Marks each)

Compare the following search strategies according to whether or not they are complete, optimal and informed. Justify your answers.

i. Breadth-first search

ii. Depth-first search

iii. Greedy best-first search

iv. Uniform-cost search

Question 2: (2 Marks: 1 Mark Each)

(b) Explain in your own words the difference between **tree search** and **graph search**.

Question 3: (5 Marks)

This question concerns heuristics in search.

   i.   Explain what is meant by a heuristic, and how heuristics can be useful in efficiently finding solutions. **(1 Mark)**
   ii.   Describe two heuristics for the 8-puzzle. **(2 Marks each)**

Question 4: (35 Marks)

For this question, you will need to use the simplified map of Romania and the

table of straight-line distances to Bucharest from Chapter 3 of AIMA.

a) Calculate the routes that would be chosen from Mehadia to Bucharest by each of:

i. Greedy search **(5 Marks)**

ii. Uniform-cost search **(5 Marks)**

iii. A* search**. (5 Marks)**

You should explain your answers and show your working

b) Suppose you are travelling from Sibiu to Bucharest. The possible routes on the map include:

- Sibiu-Fagaras-Bucharest

- Sibiu-Rimnicu Vilcea-Pitesti-Bucharest

- Sibiu-Rimnicu Vilcea-Craiova-Pitesti-Bucharest.

i. If you use the A* algorithm to calculate the route, which of these paths will be explored and which will be selected as the optimal route? **(10 Marks)**

ii. What solution would be returned if you use the greedy best-first algorithm? **(10 Marks)**

You should explain your answers and show your working.