**CIS 4930 Artificial Intelligence**

**Assignment 1**

Due date: February 12 (Sunday at 11:59 pm)

**Problem 1 (6 points)**

Answer the following questions:

1. Give your own definition of Artificial Intelligence

Answer:

1. Is AI a science, or is it engineering? Or neither or both? Explain.

Answer:

1. Imagine that the speed and memory of computers became 1000 larger. Which AI problems become trivial due to this increase, and which would not get any easier?

Answer:

**Problem 2 (4 points)**

Answer the following questions:

1. Define in your own words the following terms: state, state space, search tree, search node, goal, action, transition model, and branching factor

Answer:

1. What is the difference between a world state, a state description, and a search node? Why is this distinction useful

Answer:

**Problem 3 (15 points) (Do not use the library function)**

Implement a program that inputs a weighted directed graph, and finds the shortest path between two given vertices of this graph. Use the programing language of your choice. Your program must read a graph from a given file, prompt the user to specify two vertices, and output the shortest path between them. The format of the graph encoding is as follows:

<vertex> <vertex> <weight>

<vertex> <vertex> <weight>

<vertex> <vertex> <weight>

…

Each line encodes an edge, which points from the first to the second vertex, and the weight of this edge. The vertices of the graph are denoted by natural numbers, which may not be consecutive; for example, the vertex numbers may be 0, 2, and 8. All edge weights are positive, and they are also encoded by natural numbers. For example, the following graph consists of three vertices (denoted 0, 2, and 8) and four edges:

0 2 25

15

25

10

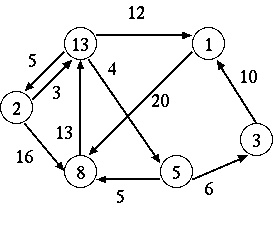
20

2 8 15

8 0 10

8 2 20

Problem 3 on Assignment 1 involves writing a program to solve the shortest path problem on a graph. In order to illustrate this problem further, sample file and graph are provided here.



Solutions:

This graph contains six vertices and ten edges. An example of a shortest path through this graph is that from vertex 2 to vertex 8.

Starting vertex: 2   
Ending vertex: 8   
The shortest path is:

Vertex 2 to vertex 13 (edge weight of 3)   
Vertex 13 to vertex 5 (edge weight of 4)   
Vertex 5 to vertex 8 (edge weight of 5)

Note that the shortest path in this case was not the path with the fewest edges, but the least total edge weight. For instance, there is an edge that directly connects vertices 2 and 8, but this edge has a weight of 16, which means it is *not* the shortest path. There is also another path (from 2-13-1-8), but this has an even greater total weight of 35.

Total weight: 12

**Submitting your assignment**

* Submission via Canvas Assignment.
  + It is your responsibility to submit these assignments in a timely fashion.
* All files should be zipped together.
* The name of your zipped folder should include your last name and ID
* There should be a readme file explaining in detail the exact steps to be taken to compile and execute the code files and the title page
* In case of any code errors, partial credit may be offered based on the code and documentation.

**Late Submission Policy**

* Late work will be not accepted.

**Rubric for Assignment 1**

**Problem 1 (6 points)**

1. [2/]
2. [2/]
3. [2/]

Don’t copy others’ work. You can google and read tutorials to understand the concepts, and can provide reference.

**Problem 2 (4 points)**

1. [2/]
2. [2/]

Don’t copy others’ work. You can google and read tutorials to understand the concepts, and can provide reference.

**Problem 3 (15 points)**

* Compile, run and test (15 points)

[6/] code compile

[5/] Run the program

[Test case - 2/] Vertex 2 to Vertex 3

[Another Test case - 2/] On the fly (any vertex to any e.g. boundary case, initial case etc.)