Artificial Intelligence: Assignment 1

Due date: September 6 (Thursday)

Problem 1 (2 points)
Read Chapters 1 and 2 of the textbook and answer the following two questions.

(a) Give your own definition of Artificial Intelligence.

(b) Give an example of an AI problem that, in your opinion, will remain unsolved until the end of the twenty-first century. Explain why this problem is so difficult.

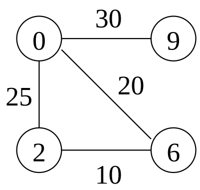
Problem 2 (4 points)
The *distance* between two vertices in a weighted undirected graph is the length of the shortest path between them. The *diameter* of the graph is the greatest distance between its vertices. That is, if we determine the distance for every pair of vertices, the maximum of these distances is the diameter.

Implement a program that inputs a weighted undirected graph and finds its diameter. Your program must read a graph from a given file and output the diameter. The format of the graph encoding is as follows:

```
<vertex> <vertex> <weight>
<vertex> <vertex> <weight>
<vertex> <vertex> <weight>
...
```

Each line encodes an edge between the two specified vertices 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, 6, and 9. All edge weights are positive, and they are also encoded by natural numbers. For example, the following graph consists of four vertices (denoted 0, 2, 6, and 9) and four edges:

```
0 2 25
2 6 10
6 0 20
9 0 30
```



Problem 3 (4 points)
Implement a program for solving the *8-puzzle* (see page 63 of the textbook). It should read a start state from a given file, and print out a sequence of moves that leads to the goal state given in Figure 3.4 of the textbook. You may assume that the puzzle always has a solution; that is, the program does not have to deal with unsolvable states. The format for encoding start states is as follows:

```
<tile> <tile> <tile>
<tile> <tile> <tile>
<tile> <tile> <tile>
```

Each `<tile>` is a digit from 0 to 8, where 0 marks the blank space, and the other digits are real tiles. For example, the following file encodes the start state from Figure 3.4:

```
5 4 0
6 1 8
7 3 2
```