ASSIGNMENT 1: STATE SPACE SEARCH (PAIR) SECTION 1

ASSIGNED DATE: 22 MARCH 2021 DUE DATE: 4 APRIL 2021

1. Figure 1 depicts the graphic representation of the highways interconnecting 8 cities {Newton; Dover; Ridgewood; Madison; Hackensack; Somerville; Washington; Columbia; i} in the state of New Jersey, United States. The actual distance of the highway connecting two cities is given in miles. For example, the highway for {Newton; Dover} is 22 miles in its actual distance.

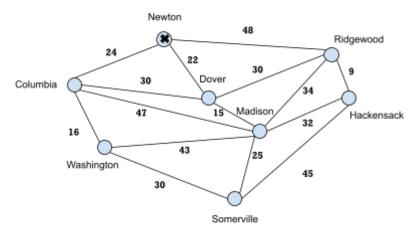


Figure 1: Cities in New Jersey, United States

- a) Write down 2 (two) possible paths that travel to all cities in which each city is visited exactly once and return to the initial starting city marked in the diagram. (3 marks).
- b) Construct the 2 (two) trees generated based on your algorithms in (a) (5 marks).
- c) Using the *nearest neighbor* and *minimal cost* algorithms, determine the search algorithm that gives a lower total distance travelled by calculating its cost (4 marks).
- 2. Based on the graph in Figure 1 and sample Python codes given, modify the Python program that solves problem (1) returning the minimal path (4 marks).

3. Solve the 8-puzzle problem given below using the A* search function f(n) = h(n) + g(n). Show your steps clearly. Solve the problem partially only until the third ply/level of the tree. The initial and goal state are given to you (4 marks).

7	4	1
3		5
6	2	8

Initial State Goal State

4. Describe your own *real world problem* that can be represented and solved using state space. Your problem must not be any of those already discussed in class (i.e., no points given for similar problems). Specify your states (including initial and goal) and operators (5 marks).