CSC124: Design & Analysis of Algorithms

2023T2

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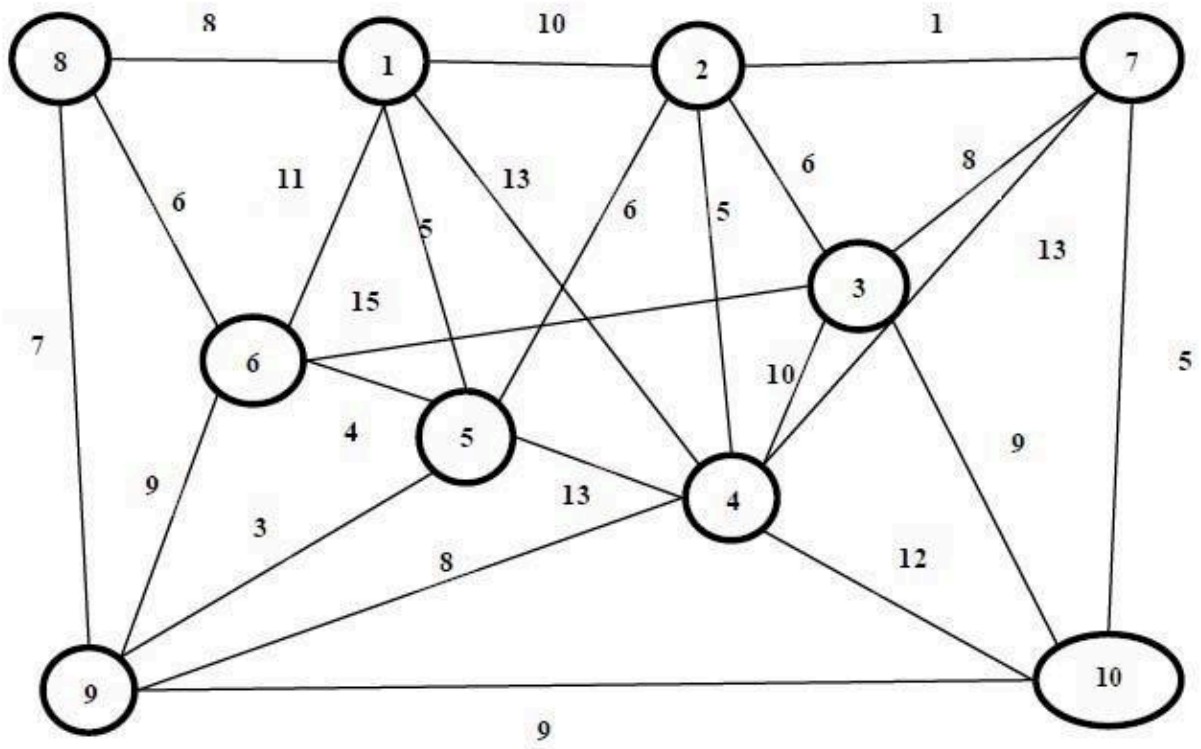
Instruction

Below is an undirected weighted graph for the Travelling Salesperson Problem. Use the python code demonstrated in the class (2024 May 09) for the following:

1. python dictionary of the graph (python dictionary code)
2. find the solution set (set/list of ALL *{exhaustive}* hamiltonian circuits)
3. identify the optimal solution (the circuit with the minimum total weights) and the minimum weight of the optimal solution (an integer)



Answers:

1. python dictionary of the graph (python dictionary code)

```
graph = {
   '1': {'2': 10, '4': 13, '5': 5, '6': 11, '8': 8},
   '2': {'1': 10, '3': 6, '4': 5, '5': 6, '7': 1},
   '3': {'2': 6, '4': 10, '6': 15, '7': 8, '10': 9},
   '4': {'1': 13, '2': 5, '3': 10, '5': 13, '7': 13,
'9': 8, '10': 12},
   '5': {'1': 5, '2': 6, '4': 13, '6': 4, '9': 3},
   '6': {'1': 11, '3': 15, '5': 4, '8': 6, '9': 9},
   '7': {'2': 1, '3': 8, '4': 13, '10': 5},
   '8': {'1': 8, '6': 6, '9': 7},
   '9': {'4': 8, '5': 3, '6': 9, '8': 7, '10': 9,},
   '10': {'3': 9, '4': 12, '7': 5, '9': 9,}
}
```

2. find the solution set (set/list of ALL *{exhaustive}* hamiltonian circuits)

   # Attached File - ListOfCircuits.txt

3. identify the optimal solution (the circuit with the minimum total weights) and the minimum weight of the optimal solution (an integer)

```
Number of Possible Solutions: 690
Shortest path weight: 49
Shortest path index: 491
Shortest path: ['1', '8', '6', '5', '9', '4', '2',
'7', '10', '3']
```