**CPT\_S 580 Project**

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**Topic: *A heuristic algorithm for Traveling Salesman Problem (TSP)***

1. **The Implementation of the Algorithm**

The Algorithm I used to solve TSP is called *Double the Tree*.

The implementation process is that:

1. Firstly, computes the minimum spinning tree T of the input graph
2. And then constructs the Eulerian graph H = 2T by doubling each edge of T.
3. Constructs A Eulerian tour of H. That tour is also a tour in G.
4. Lastly, obtain a Hamiltonian cycle by shortcutting the tour.
5. **Result**

Input: the adjacent matrix of input graph.

Output: The sequence of the TSP tour computed by the algorithm and the total cost.

Exercise 6.4.2

a -> d -> e -> c -> b -> a

The total cost: 15

Exercise 6.4.3

a -> d -> c -> e -> b -> a

The total cost: 29

Exercise 6.4.4

a -> c -> e -> d -> b -> f -> a

The total cost: 36

Exercise 6.4.5

a -> f -> e -> b -> c -> d -> a

The total cost: 35

1. **Answer to Questions**
2. For graphs 6.4.2. and 6.4.3, find the optimal cost of a Hamiltonian cycle by exhaustively trying out all possibilities. Did your implementation of Algo. 6.4.2 find the actual optimal cycles for these two graphs?

The optimal cost I found for 6.4.2 is 15 and the optimal cost I found for 6.4.3 is 29, which are the same values as the results computed by my implementation of Algo. 6.4.2.

1. Is the found value within the multiplicative factor of 2 from the optimal cost?

Yes, because both graph 6.4.2 and 6.4.3 obey the triangle inequality.