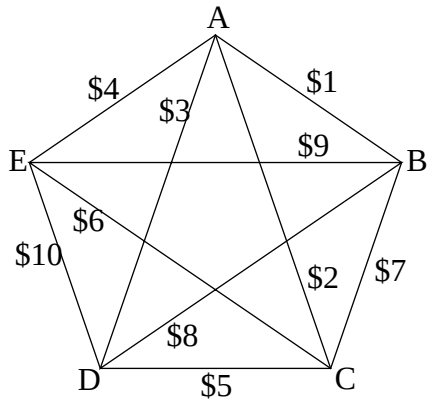
Data Structures and Algorithms COMP-251

Problem Assignment #6

1. Greedy Algorithms and Least Cost Hamiltonians

Consider the Traveling Salesman Problem for the network below. The Greedy algorithm for computing a least-cost Hamiltonian cycle starting at some vertex X always chooses the least costly edge to travel to the next city. Show for this network that no matter which vertex is used as a starting vertex, the Greedy algorithm will never find the Hamiltonian cycle of least cost.



2. Hamiltonian Cycles in Dense Graphs

Ore's Theorem states that: if a connected graph $G=(V, E)$ with n vertices (n greater than or equal to 3), is such that for each pair of non-adjacent vertices v and w we have that

$$d(v) + d(w) \geq n$$

then G contains a *Hamiltonian cycle*. In class we saw a proof of this theorem by ***backwards induction***. Convert this proof to an algorithm for computing a Hamiltonian cycle in such graphs in $O(n^2)$ worst-case time. Describe the algorithm, the data structures used, and the complexity analysis in detail.

3. Parallel Computation Models

Prove that computing the nearest point from a query point to a data-base of n points may be computed in parallel by a layer of n threshold-logic units and a maximum selector.