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HW 9

1 To prove that TSP is NP complete one must show that TSP is in NP and is NP hard

a TSP is in NP

Graph G(V,E) int K, Cert A tour of G: T

If T does not contain all vertices return false

if sum of all edges in T , k return true

else return false

the time taken is O(m+n) which is poly size there fore it runs in poly time.

b TS is NP hard

Existing NP hard problem is Hamiltonian cycle problem

reduction from Hamiltonian to TSP is

Input G:(V,E)

create new graph G' with V (=n) vertices same as V but is a complete graph

for each pair of (u,v) in G'

if (u,v) is and edge in G

set its cost to 0

otherwise set its cost to 1

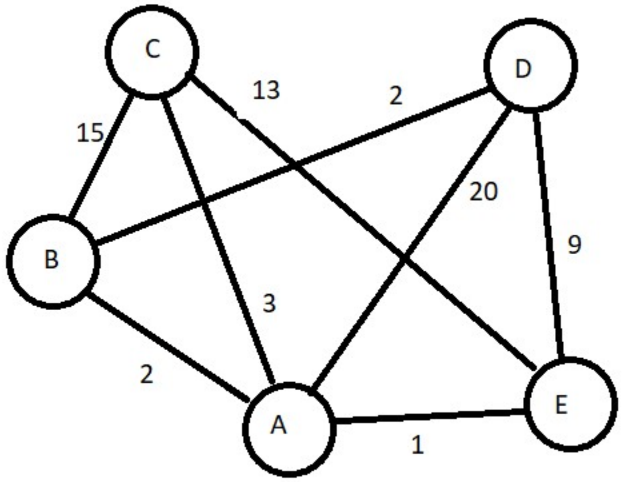
return (G',0)

this takes O(n^2) which is poly time. Hence the reduction works in poly time.

Therfore TSP is NP hard and TSP is NP-complete

2

A



b A-B-D-E-C

C Accuracy is 100 %