Tutorial-4

Graded

Student

Abhinav Shripad

Total Points

2.5 / 3 pts

Question 1

(no title)

Resolved **2.5** / 3 pts

+ 0.6 pts Written ”I do not know how to approach this problem” Correct

✔ **+ 1 pt** Claiming that independent vertex cover exists if and only if G is bipartite

✔ **+ 1 pt** Proof idea (forward implication)

+ 0.5 pts Proof idea (backward implication)

✔ **+ 0.5 pts** Algorithm for testing bipartiteness (Even just mentioning that the algorithm has been discussed previously is enough)

+ 0 pts Incorrect

Regrade Request **Submitted on: Sep 09**

Sir I did not claim that G is bipartite <-> Vertex cover exists. It is just a note at the bottom nothing to do with the solution.
I gave the algorithm for finding vertex cover at the top, with no reference to bipartiteness and gave the proof for the algorithm next.

I have graded your submission according to the rubrics and as you have written in submission. The algorithm is still correct as instead of coloring the vertices you are adding it into 2 sets S1 and S2.

Reviewed on: Sep 09

COL351: Analysis and Design of Algorithms
Tutorial 4

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Group: 3

Algorithm:- start with any vertex, say u, and put it in the set S_1 and starts traversing the graph by DFS/BFS. For any vertex v, if $v \in S_1$ put all its neighbour in S_2 and if $v \in S_2$, put all its neighbour in S_1.

→ TC ⇒ DFS/BFS + Maintaining vertex is in which set. ← Can be done using an array

$= O(V+E) + O(V)$
$= O(V+E)$

If the algorithm faces any contradiction at any points, ie $u \in S_1$ and v neighbour of u is already in S_1, then NO independent vertex cover exists. Apply this algorithm for all connected components of G.

Proof:- by definition, of all edges $(u,v) \in E$, exactly one of u,v is in the set of independent vertex cover. This divides all the vertex into 2 disjoint set S and V−S. See that S and V−S are symmetrical so we can assume that our starting vertex belong to any and start assinging sets to other vertices accordingly.

Note:- Bipartite Coloring ⟷ Independent vertex set