

Pset 6

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- (c) Collaborators:
- (d) I have followed the academic integrity and collaboration policy
- (e) Hours:

1 Minimum Spanning Tree

- (a) Starting from a random vertex v in S , use DFS to **Explore** and count the number of reachable nodes from v . If the number of nodes in this component-from- v is not equal to the total number of vertices in S , we know S is not connected. Otherwise, all vertices in S are reachable from v and S is connected. This takes $O(|E| + |V|)$ time through DFS.
- (b) Starting from a random vertex v in S , use DFS to **Explore** S and keep track of the nodes visited. If there is a back-edge detected where a node is a neighbor to an already-visited node that isn't the node used to get to that current node, we know S contains a cycle. Otherwise, if we manage to DFS through all of S and detect no back-edge, S should be cycle-free. This takes $O(|E| + |V|)$ time through DFS.
- (c) Starting from a random vertex v in S , use DFS to **Explore** all of S . If we fail to encounter a node in S that exists in V , we know that S does not have vertex set V . Otherwise if all the nodes in V are present in S , we have vertex set V . This takes $O(|E| + |V|)$ time through DFS.
- (d) Check MST

2 SAT Variations

3 Graph Coloring