

ALGORITHMS, FALL 2019, HOMEWORK 10

- This assignment is worth 1 unit.
- Due on Saturday, December 7, at noon.
- No credit will be given if you include the problem statement in your submission. All other formatting rules still apply.

1. You are given a graph $G = \{V, E\}$ and its minimum spanning tree, $\text{MST}(G)$, both in adjacency list representation. Suppose that we wish to add a vertex v to G , along with some weighted edges from v to other vertices in G . In other words we create a new graph, G' . Let $\text{MST}(G')$ be the minimum spanning tree of G' . You may assume that all edge weights are distinct.
 - (a) Can any edge of G that is not in $\text{MST}(G)$ end up in $\text{MST}(G')$? Provide a clear proof.
 - (b) Your job is to produce $\text{MST}(G')$, given that G and $\text{MST}(G)$ are already available. Outline an algorithm, in English. Justify the time-complexity of your algorithm.