Assignments 9 and 10

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Problem

Consider a graph $G = (V, E)$. An edge e has a weight $w_e \in R$. Assume there are no negative cycles. Each edge is colored as either blue, or red, or white. Given a source node s, design an $O(n \times m)$-algorithm to find the shortest path from s to t so that the edges in this path are with colors red, blue, white alternatively. For example, this path has edges with colors 'red, blue, white, red, blue, white, red, ...' or 'blue, white, red, blue, white, red, blue, white, ...'. Show your algorithm's running time.

Problem

Suppose you have an undirected graph G with weighted edges and a minimum spanning tree T of G. Design an algorithm to update the minimum spanning tree when the weight of a single edge e is decreased.

The input to your algorithm is the edge e and its new weight; your algorithms should modify T so that it is still a minimum spanning tree.