Homework 5

Due on November 17

Question 1[25 points] Design an $O(k|E|)$ time algorithm to find the shortest path between two vertices a and b in a directed graph with weighted(can be negative) edges, where it is guaranteed that the shortest path between any two vertices has at most k edges.

Question 2[25 points] You are given an undirected graph $G = (V, E)$ with positive weighted edges, and an edge $e \in E$. Design an $O(V^2)$ algorithm to compute the length of the shortest cycle containing e.

Question 3[25 points] Prove that if all edge weights are distinct in an undirected graph $G = (V, E)$, then it has a unique minimum spanning tree.

Question 4[25 points] Design an algorithm to compute the maximum spanning tree of a graph.