

Introduction To Algorithms
CS430

Spring 2013
HomeWork 11
Due 29 April

1. **Problem 1:** The following divide and conquer technique has been proposed but does not find the minimum spanning tree:

- (1) Partition the vertices into sets S_1 and S_2 such that $|S_1| = |S_2| = |V|/2$
- (2) Recursively find the minimum spanning trees on S_1 and S_2 , calling them T_1 and T_2 , respectively.
- (3) Find the minimum edge e connecting S_1 and S_2 and create a tree T where $T = T_1 \cup T_2 \cup \{e\}$. (Note that a spanning tree can be defined by a set of $n - 1$ edges).

Show why T is not a minimum spanning tree.

(10)

2. **Problem 2:** (i) Show an example of a graph with negative edges where Dijkstra's algorithm fails to give the correct answer.

(10)

(ii) Suppose we have a directed graph with edges that have probability of successful transmission given by $\gamma(e)$. Find a path from s to t with the highest probability of success. Note that the probability of success of a path is the multiplication of probabilities on the edges of the path (assuming independence).

(20)

3. **Problem 3:** How can one detect negative cycles in the All-Pairs-Shortest-Paths algorithm (Floyd-Warshall)?

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