

Homework Assignment #10
Due: November 26, 2015 at 4:00 p.m.

1. Let $G = (V, E)$ be a connected, edge-weighted, undirected graph. Let T be a minimum spanning tree of G . Let (u, v) be any edge in T . Prove that there exists a set A of nodes of G such that (u, v) is the minimum weight edge among all the edges that have one endpoint in A and one endpoint in $V - A$.
2. We can model a computer network as an undirected graph. Nodes represent computers and edges represent wires connecting pairs of computers. Each edge has an associated bandwidth (the number of bits per second that can be sent across the edge). The bandwidth of a path is the minimum bandwidth of any edge in the path.
 - (a) Given such a network graph, design an algorithm that finds, for every pair (i, j) of nodes, the maximum bandwidth of any path from i to j . Your algorithm should be as efficient as possible.
 - (b) What is the running time of your algorithm on a graph with n nodes and m edges? Express your answer using Θ notation, as a function of n and m . (Assume that you can do operations like comparisons, addition and subtraction on the numbers used to represent each edge's bandwidth in $O(1)$ time.)