

CS 213

Homework Assignment 9

Given: April 07, 2009

Due: April 14, 2009

This assignment is due by the end of the class on the due date. Unless all problems carry equal weight, the point value of each problem is shown in []. To receive full credit all your answers should be carefully justified. Each solution must be the student's own work. Assistance should be sought or accepted only from the course staff. Any violation of this rule will be dealt with harshly.

1. Let T and U be $(2,4)$ trees storing n and m items, respectively, such that all the items in T have keys less than the keys of all items in U . Describe an $O(\log n + \log m)$ time algorithm for *joining* T and U into a single tree that stores all the items in T and U (destroying the old versions of T and U).
2. NASA wants to link n stations spread over the country using communication channels. Each pair of stations has a different bandwidth available, which is known apriori. NASA wants to select $n - 1$ channels (the minimum possible) in such a way that all the stations are linked by the channels and the total bandwidth (defined as the sum of the individual bandwidths of the channels) is maximum. Give an efficient algorithm for this problem and determine its worst-case time complexity.
3. Show that if all the weights in a connected weighted graph G are distinct, then there is exactly one minimum spanning tree for G .