$22C : 031$ ($CS : 3330 : 0001$) Algorithms

Homework 6

March 28, 2012

This homework is based on our discussions of algorithm design using divide-and-conquer (the last question) and our discussion of minimum spanning trees. The homework is worth 10 points. Hints for the first and second questions are posted within the "content" link on the ICON page for this course.

1. Exercise 19 of Chapter 4. (3.5 points)

2. Exercise 28 of Chapter 4. (3.5 points)

3. You are at a political convention with n delegates, each one a member of exactly one political party. There are multiple parties. It is impossible to tell which political party any delegate belongs to; in particular, you will be summarily ejected if you ask. However, you can determine whether any two delegates belong to the *same* party or not by introducing them to each other – members of the same party always greet each other with smiles and friendly handshakes; members of different parties always greet each other with angry stares and insults.

   Let us call a party *popular* if it contains strictly more than $n/3$ delegates. Notice that there can be at most two popular parties. Describe an algorithm that identifies a member (any member) from each popular party using only $O(n \log n)$ introductions. (Hint: Carefully modify the divide-and-conquer algorithm from the posted solution to the version of this problem from Homework 4.) (3 points)

The homework is due Wednesday, April 4, in class; if you can't make it to class on that day, just make sure you get it to me by that time.