Homework 2
Due Feb 28, 2005

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General Instructions

- Please typeset your solutions using either LaTeX or TeX. Submit a printout of your solution *before* class.
- You may find this homework hard. Don't worry if you cannot solve every problem perfectly.
- You may discuss the problems with your classmates, but you must write up your solutions on your own, in your own words. If you borrowed a key idea from someone else, please acknowledge them like a true scholar.
- You may refer to both textbooks and to all of the papers linked from the course web site. You may refer to math textbooks or the web site `mathworld.wolfram.com` to look up any math you may have forgotten. But referring to anything else (other web sites, other published papers, etc.) is a *violation of the honor code*.
- Make sure your solutions are complete, clean, concise and rigorous. Please do not submit a solution that you know to be erroneous or incomplete in the hope that you may get some partial credit. You will not.
- Please think carefully about how you are going to organise your solutions *before* you begin writing.

The Problems

Note: [MR] refers to the Motwani-Raghavan book and [CLRS] to the Cormen-Lieserson-Rivest-Stein book.

1. Solve Problem 23-1 (second-best minimum spanning tree) from [CLRS]. For part (c), do not use as a subroutine the ultra-complicated linear time MST verificataion algorithm we sketched in class; there's a much simpler solution. [5+10+15+10 points]

2. Solve Problem 23-3 (bottleneck spanning tree) from [CLRS]. [10+10+15 points]

3. Suppose m rooks are placed on an $n \times n$ chessboard. Describe a polynomial (in m and n) time algorithm that finds a maximum-sized subset of the rooks such that if we leave this subset on the chessboard and remove all other rooks, then no two rooks attack one another. (Two rooks are said to attack one another iff they are either in the same row or in the same column with no other intervening rooks between them.) [10 points]

4. Solve Exercise 35.1-3 from [CLRS]. [15 points]