SPRING 2002: **COT 6405** Analysis of Algorithms

[Homework 2; Due Feb 14 in class]

Problems

14. In the algorithm Select, the input elements were divided into groups of 5. Will the algorithm work in linear time if they are divided into groups of size 7? Why? Argue that Select does not run in linear time if groups of 3 are used instead. [Problem 9.3-1]
15. Explain in a couple of sentences how quick sort can be modified to work in $O(n \log n)$ time in the worst case using the Select procedure.
16. The k^{th} quantiles of an n-element set are the $k-1$ order statistics that divide the sorted set into k equal-sized sets (to within 1). Give an $O(n \log k)$-time algorithm to list the k^{th} quantiles of a set. [Problem 9.3-6]
17. Is the operation of deletion "commutative" in the sense that deleting x and then y from a binary search tree leaves the same tree as deleting y and then x? Argue why it is or give a counterexample. [Problem 12.3-5]
18. Show the red-black trees that result after successively inserting the keys $41, 38, 31, 12, 19, 8$ into an initially empty red-black tree. [Problem 13.3-2]
19. Write pseudo-code for Left-Rotate that operates on nodes in an interval tree and updates the *max* fields in $O(1)$ time. [Problem 14.3-1]