Midterm exam 2: Friday, May 15. Closed books/notes. No calculators. Covering topics from (inclusively) quick-sort to whatever to be covered on Monday, 5/11.

1. Show the result of the array (7, 2, 6, 3, 1, 12, 9, 5, 10, 4, 8, 11) converted into a max-heap.

2. Write pseudocode for the procedure Extract-Max(S) that removes and returns the element in S with the largest key, where S is represented by a max-heap.

3. Draw the decision tree for quicksort operating on three elements. (Use the Lumoto Partition as given in the handouts.)

4. Describe an algorithm that, given an array of n integers in the range 0 to k, preprocesses its input and then answers any query about how many of the n integers fall into a range [a..b] in O(1) time. Your algorithm should use no more than O(n + k) preprocessing time.

5. Design a simple scheme that makes any comparison-based sorting algorithm stable.