Problem Set 3

Assigned: June 8
Due: June 15

Problem 1.
Suppose that you are given the problem of returning in sorted order the $k$ smallest elements in an array of size $n$, where $k$ is much smaller than $n$, but much larger than 1.

a. Describe how heapsort can be adapted to this problem.

b. Find the worst-case running time of the modified heapsort as a function of $k$ and $n$.

Problem 2.
Show that any comparison method for solving the problem in problem 1 must take at least $\Omega(k \cdot \lg(n))$ in the worst case

Problem 3. (CLR&S 7.5-6)
Give an $O(n \cdot \lg(k))$ time algorithm to merge $k$ sorted lists into one sorted list, where $n$ is the total number of elements in all the input lists. (Hint: Use a heap for $k$-way merging.)