CHAPTER 2 HOMEWORK

Problem 1. Illustrate the operation of Heap Sort, Merge Sort and Quick Sort of the following arrays: (2p)

a) $A = < 5, 13, 2, 25, 7, 20, 8, 4 >$
b) $B = < 100, 77, 49, 1{,}29, 51{,}7{,}15{,}100 >$

Problem 2. What are the minimum and maximum numbers of elements in a heap of height h? (1p)

Problem 3. Show that an n-element heap has height $\lfloor \log_2 n \rfloor$ (2p)

Problem 4. Show that, with the array representation for storing an n-element heap, the leaves are the nodes indexed by $\lfloor n/2 \rfloor, \lfloor n/2 \rfloor + 1, \dots, n - 1$. (2p)

Problem 5. What is the running time of heapsort on an array A of length n that is already sorted in increasing order? What about decreasing order? (1p)

Problem 6. What is the running time of Quicksort when all elements of array A have the same value? (1p)

Problem 7. Rewrite Quicksort algorithm to sort an array of integers by decreasing order. (1p)