COSC 202 Tutorial Exercises on Sorting

Two sets of keys (or data) are given.

A = 36 71 14 65 49 25 92 51 9 54 17 4 83 30 78 18

B = 12 11 13 14 9 10 15 16 1 2 3 4 5 6 7 8

(1) Trace heapsort with data A. Draw the tree figure at the end of each siftup.

(2) Trace partition with data A.

(3) Trace quicksort with data A with the help of recursion tree. A recursion tree is a binary tree each of whose node correspond to each call to quicksort. Also associated with each node are parameters to the procedure call and the data partitioned.

(4) Trace mergesort with data B. Count the number of comparisons

(5) Trace natural mergesort with data B. Count the number of comparisons

(6) Trace minimal mergesort with data B. Count the number of comparisons.

(8) Prove the following by mathematical induction for n= 2^k ( k ≥ 0 ).

The recurrence for T(n) is given by

T(1) = 0
T(2n) = 2T(n) + 2n -1

Then T(n) = nlog_2n - n + 1

(9) Trace radixsort with data A.

(10) Develop ternary heapsort. A ternary tree has up to three children at each node. If we imbed the ternary tree in an array the three children of node i can be obtained in the positions 3i-1, 3i, 3i+1.