FTP_Alg_Week 3: Exercises

jungkyu.canci@hslu.ch

30 September 2024

Exercise 1 *Using the figure in slide 25 of the slide of week 2 as a model, illustrate the operations of HEAPSORT on the array*

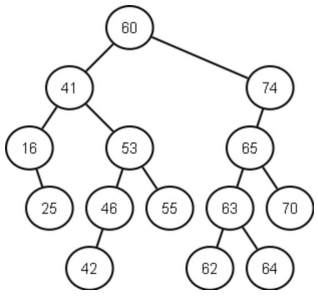
$$A = \langle 5; 13; 2; 25; 7; 17; 20; 8; 4 \rangle.$$

Exercise 2 *Consider a binary search tree T whose keys are distinct. Show that if the right subtree of a node x in T is empty and x has a successor y, then y is the lowest ancestor of x whose left child is also an ancestor of x. (Recall that every node is its own ancestor.)*

Exercise 3 *Write the TREE-PREDECESSOR procedure.*

Exercise 4 *Let T be a Binary Search Three. Prove that it always possible to insert a node z as a leaf of the three T with $z.key = r$.*

Exercise 5 *Let T be a Binary Search Three given in the figure below*



Give the output tree after the call of TREE-DELETE(T, z) where z is the node with key 41.

Exercise 6 (*) *What is the difference between the binary-search-tree property and the min-heap property? Can the min-heap property be used to print out the keys of an n-node tree in sorted order in $O(n)$ time? Show how, or explain why not.*