

EL9343 Homework 4

(Due Nov 13rd, 2020)

No late submission accepted

All problem/exercise numbers are for the third edition of CLRS text book

1. Given an empty AVL tree and sequence $\{5, 1, 2, 4, 11, 17, 3, 7\}$, insert each element of the sequence to the AVL tree, one at a time, following the given order of the sequence. Draw all the 8 AVL trees after each insertion.
2. What is the running time of DFS if the graph is given as an adjacency matrix? Justify your running time.
3. Explain how a vertex u of a directed graph can end up in a depth-first tree containing only u , even though u has both incoming and outgoing edges in G .
4. Write a method that takes any two nodes u and v in a tree T , and quickly determines if the node u in the tree is a *descendant* or *ancestor* of node v .
5. Problem 22-1 on page 621 of CLRS.
6. Give an example of a directed graph $G = (V, E)$, a source vertex $s \in V$, and a set of tree edges $E_\pi \subseteq E$ such that for each vertex $v \in V$, the unique simple path in the graph (V, E_π) from s to v is a shortest path in G , yet the set of edges E_π cannot be produced by running BFS on G , no matter how the vertices are ordered in each adjacency list.