Homework lecture 4

Trees

1. Given a tree, your task is to write a program with following functions
   - Calculate the height of the tree.
   - Write out the order of nodes following the preorder traversal.
   - Write out the order of nodes following the postorder traversal.
   - Check if the given tree is a binary tree? If yes, write out the order of nodes in inorder traversal.

Input: Data come from the keyboard:

- The first line contains integer numbers *N, M* indicating the number of nodes, and edges, respectively.
- *M* following lines each contains two integer numbers *u, v* indicating that *u* is the parent of *v*.

Output: Data are written to the screen as following:

- The height of the tree
- The order of nodes in preorder traversal
- The order of nodes in postorder traversal
- The order of nodes in the inorder if the tree is binary. Otherwise, write the string 'NOT BINARY TREE'

Keyboard	Screen
5 4 1 2 1 3 2 4 2 5	2 1 2 4 5 3 4 5 2 3 1 4 2 5 1 3

2. Given a list of integer numbers: 2, 1, 10, 6, 3, 8, 7, 13, 20.

- Draw the binary search tree
- Draw the binary search tree after inserting values: 14, 0, 35
- Draw the binary search tree after deleting: 6, 13, 35

3. Given a list of integer numbers: 2, 1, 10, 6, 3, 8, 7, 13, 20.

- Draw the heap tree
- Draw the heap tree after inserting values: 14, 0, 35
- Draw the heap tree after deleting: 6, 13, 35

4. Use random.org to generate a set of 10 integers from 1-20 (S1).

- Insert elements from S1 to a binary search tree one by one and draw the binary search tree after each step.
- Write out the procedure to find and remove the maximum element from binary search tree **in detail.**
- Write out the procedure to find and remove the minimum element from binary search tree **in detail.**

5. Use random.org to generate another set of 10 integers from 1-20 (S2).

- Draw the heap (tree) from S2
- Insert elements from S1 to this heap one by one and draw the heap after each step.
- Write out the procedure to find and remove the maximum element from binary search tree **in detail.**