PRACTICAL EXAM [1] – CSD201 – SUMMER 2023
Duration: 85 minutes

Write a Java project that manages information of **teachers** on a **extended binary search tree T**. Each node in T contains four fields of: (a) **data**: teacher's information (included **code**: int, **coeff**: double), (b) **left**: the link to the left sub-tree, (c) **right**: the link to the right sub-tree, and (d) ***bal***: the differences in heights of left sub-tree and right sub-tree. Given the array **A** of teacher information: (5, 5), (3, 3), (2, 2), (4, 4), (7, 7), (6, 6), (8, 8), (1, 1), (9, 9).

I. For binary search tree class, write the following functions:
   1. [2.5 m] To obtain the tree from A.
   2. [1.0 m] Increase M/2.0 to the coeff of each teacher where M is the maximum coeff.
   3. [1.0 m] Print all nodes in the form of <data, level>.
   4. [1.0 m] Determine the field *bal* for all node.
   5. [1.0 m] Output all teachers in pre-order traversal (recursion).

II. [2.0 m] Write the function tree_sort() to sort an array of teachers in decreasing order of code (Avoid using recursion and java built-in classes! Using bubble sort!).

III. [1.5 m] A main function to test all requirements.

Note: Submit java files only!