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

Write a Java file that manages information of **pupils** on a **binary search tree T**. Each node in T contains four fields of: (a) **data**: pupil's information (included **rollno**: int, **mark**: integer, [0; 100]), (b) **left**: the link to the left sub-tree, (c) **right**: the link to the right sub-tree, and (d) ***level***: the level of node in tree (known that the level of the root is 0). *The order of nodes on T is based on the field rollno*. Given the array **A** of pupil information: (5, 5), (3, 3), (2, 2), (4, 44), (7, 47), (6, 100), (8, 88), (1, 11), (9, 99).

I. For binary search tree class, write the following functions:
   1. [Mark: 2.5] To obtain the tree T from A.
   2. [Mark: 1.0] Decrease m/2.0 to the mark of each pupil where m is the minimum mark.
   3. [Mark 1.0] Determine the field *level* for all node.
   4. [Mark 1.0] Check if T is an AVL tree.
   5. [Mark 1.0] Output rollno and mark of all pupils stored in T by pre-order (with a loop manner!).

II. [Mark 1.75] Write the function **radixSort** to sort array A in increasing order of mark. It will be also acceptable to use countSort if you get stuck in implementing radixSort but it must be discussed about disadvantages of countSort in comments.

III. [Mark 1.75] A main function to test all requirements.

Note: Submit 1 java file only! Can use own lab exercises, course notes, but NOT Internet access.