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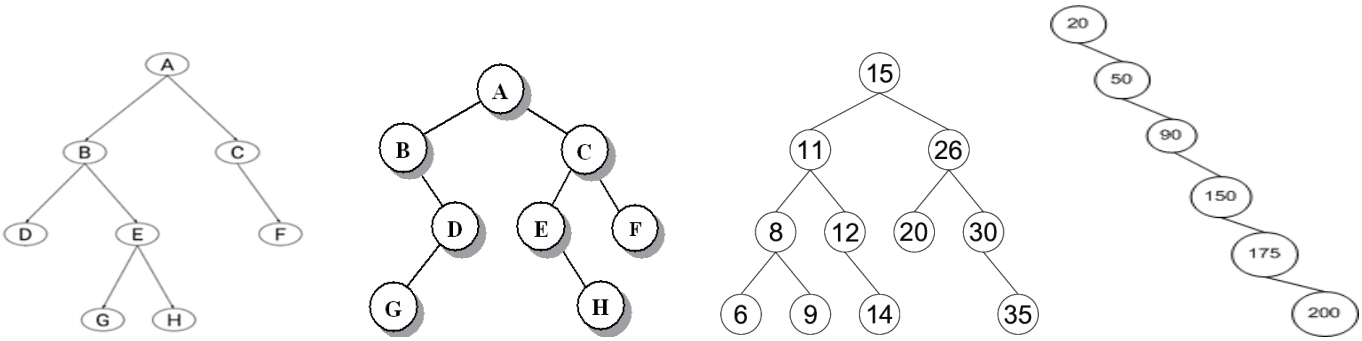
Data Structure.

Exercise 10: Binary Tree

Q1: Write down the array representation of each of the following binary trees. Also, decide the relation between the index of the parent node and the indices of the two children's nodes.



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Q2: Classify which of the trees in the first question is: Full, Degenerate, Complete, Perfect or/and Balanced tree.

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Q3: Given the following sequence of integers, construct a complete binary tree that represents the given sequence. Also, write down the level number associated with the set of elements stored at it starting from level 0. Also, decide if each of the constructed trees can be a binary search tree? Why?

a)-arr[] = {1, 2, 3, 4, 5, 6}

b)-arr[] = {1, 2, 3, 4, 5, 6, 6,NULL, 6, 6, 6}

c)-arr[] = {A, F, C, D, B,K, L, NULL, U,V,M ,N ,T ,R}

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Q4: Construct a Binary Search Tree (BST) using the following sets of numbers considering that the root of the tree is the first element in the sequence. Also find the following:

1-The number of nodes in the left subtree and right subtree of the root.

2- The height of the tree.

3- Classify which of the constructed trees is Full, Degenerate, Complete, Perfect or/and Balanced tree.

a)- 50, 70, 60, 20, 90, 10, 40, 100

b)- 50, 15, 62, 5, 20, 58, 91, 3, 8, 37, 60, 24

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Q5: Prove that the height of a complete binary tree is O (log N) where *N* is number of nodes in this tree.

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