Check if the given Binary Tree a Max Heap [GFG](https://practice.geeksforgeeks.org/problems/is-binary-tree-heap/1)

Given a binary tree. The task is to check whether the given tree follows the **max heap** property or not.  
**Note:**Properties of a tree to be a max heap - Completeness and Value of node greater than or equal to its child.

Example 1:

7

/ \

5 3

/ \ / \

4 3 2 1

Output: The Binary Tree is a Max Heap

Example 2:

10

/ \

20 30

/ \

40 50

Output: The Binary Tree is not a Max Heap

**Approach 1: Function to check if the binary tree is a heap using the recursive approach**

* **Function Purpose:** To check if the binary tree is a max heap using a recursive approach.
* **Explanation:**
  + Checks if the tree is complete and follows max heap properties recursively.
  + It checks if the value of each node is greater than its children and if the tree is complete.
* **Time Complexity:** **O(N), where N is the number of nodes in the tree.**
* **Space Complexity: O(H), where H is the height of the tree.**

**Approach 2: Function to check if the binary tree is a heap using the iterative approach**

* **Function Purpose:** To check if the binary tree is a max heap using an iterative approach.
* **Explanation:**
  + Performs level-order traversal to check if each node's value is greater than its children.
* **Time Complexity:** **O(N), where N is the number of nodes in the tree.**
* **Space Complexity: O(N), where N is the number of nodes of the tree.**

**Approach 3: Function to check if the binary tree is a heap using an optimized approach**

* **Function Purpose:** To check if the binary tree is a max heap using an optimized iterative approach.
* **Explanation:**
  + Checks if the tree is a complete max heap using an optimized approach.
* **Time Complexity**: **O(N), where N is the number of nodes in the tree.**
* **Space Complexity: O(N), where N is the number of nodes of the tree.**

**Conclusion:**

**The "Recursive Approach" is a slightly more efficient and less space-consuming way to check if a binary tree is a max heap.** The "Iterative Approach" and the "Optimized Iterative Approach" use level-order traversal and require more space to store the nodes at each level for the check.