94. Binary Tree Inorder Traversal

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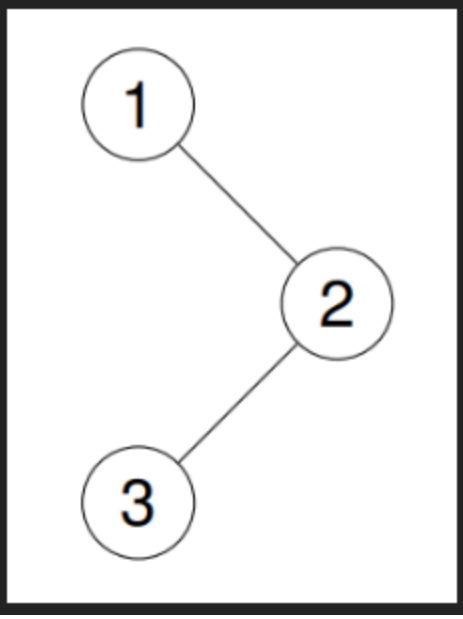
Given the `root` of a binary tree, return *the inorder traversal of its nodes' values.*

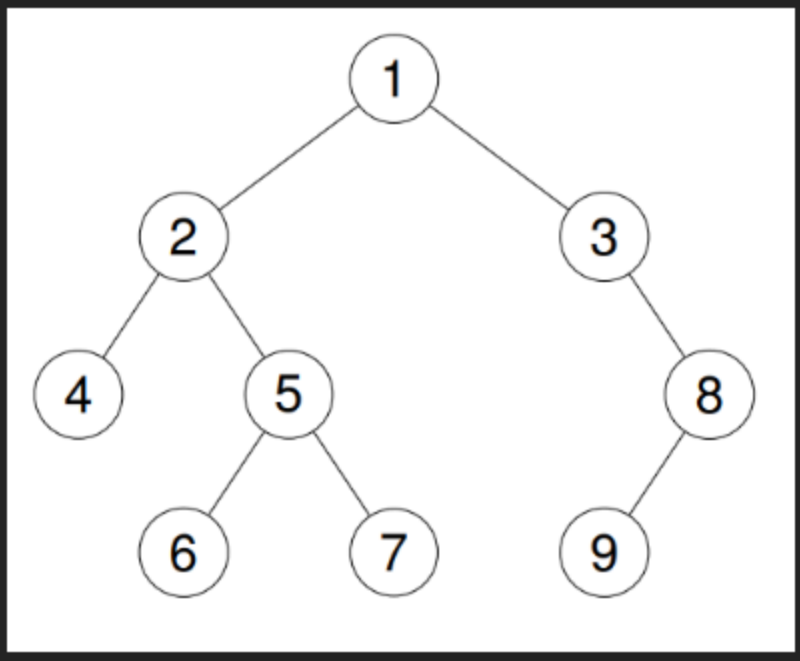
Example 1:

> **Input:** `root = [1,null,2,3]`
>
> **Output:** `[1,3,2]`
>
> **Explanation:**



Example 2:

> **Input:** `root = [1,2,3,4,5,null,8,null,null,6,7,9]`
>
> **Output:** `[4,2,6,5,7,1,3,9,8]`
>
> **Explanation:**



Example 3:

> **Input:** `root = []`
>
> **Output:** `[]`

Example 4:

> **Input:** root = [1]
>
> **Output:** [1]

Constraints:

- The number of nodes in the tree is in the range `[0, 100]`.
- `-100 <= Node.val <= 100`

Follow up: Recursive solution is trivial, could you do it iteratively?

Python:

```
# Definition for a binary tree node.
# class TreeNode:
#     def __init__(self, val=0, left=None, right=None):
#         self.val = val
#         self.left = left
#         self.right = right
class Solution:
    def inorderTraversal(self, root: Optional[TreeNode]) -> List[int]:
        result, stack = [], []
        current = root

        while current or stack:
            # Reach the leftmost node of the current node
            while current:
                stack.append(current)
                current = current.left

            # Current is None at this point
            current = stack.pop()
            result.append(current.val)   # Visit the node
            current = current.right      # Explore right subtree

        return result
```

JavaScript:

```
/**
 * Definition for a binary tree node.
 * function TreeNode(val, left, right) {
 *     this.val = (val===undefined ? 0 : val)
 *     this.left = (left===undefined ? null : left)
 *     this.right = (right===undefined ? null : right)
 * }
 */
/**
 * @param {TreeNode} root
 * @return {number[]}
 */
var inorderTraversal = function(root) {
    let result = [];

    function dfs(node) {
        if (!node) return;
        dfs(node.left);         // Visit left
        result.push(node.val);  // Visit root
        dfs(node.right);        // Visit right
    }

    dfs(root);
    return result;
};
```

Java:

```
/**
 * Definition for a binary tree node.
 * public class TreeNode {
 *     int val;
 *     TreeNode left;
 *     TreeNode right;
 *     TreeNode() {}
 *     TreeNode(int val) { this.val = val; }
 *     TreeNode(int val, TreeNode left, TreeNode right) {
 *         this.val = val;
 *         this.left = left;
 *         this.right = right;
 *     }
 * }
 */
class Solution {
```

```
    public List<Integer> inorderTraversal(TreeNode root) {
        List<Integer> result = new ArrayList<>();
        inorderHelper(root, result);
        return result;
    }

    private void inorderHelper(TreeNode node, List<Integer> result) {
        if (node == null) return;

        inorderHelper(node.left, result);
        result.add(node.val);
        inorderHelper(node.right, result);
    }
}
```