

Problem 1612: Check If Two Expression Trees are Equivalent

Problem Information

Difficulty: Medium

Acceptance Rate: 0.00%

Paid Only: No

Problem Description

A

binary expression tree

is a kind of binary tree used to represent arithmetic expressions. Each node of a binary expression tree has either zero or two children. Leaf nodes (nodes with 0 children) correspond to operands (variables), and internal nodes (nodes with two children) correspond to the operators. In this problem, we only consider the

'+'

operator (i.e. addition).

You are given the roots of two binary expression trees,

root1

and

root2

. Return

true

if the two binary expression trees are equivalent

. Otherwise, return

false

Two binary expression trees are equivalent if they

evaluate to the same value

regardless of what the variables are set to.

Example 1:

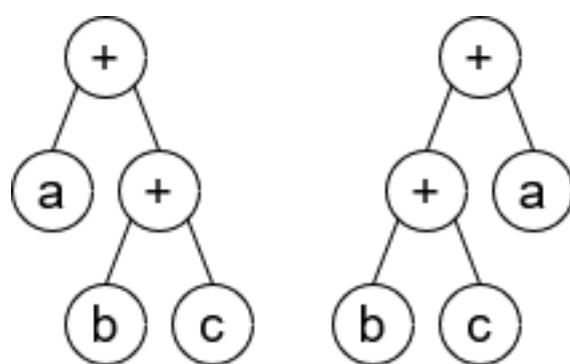
Input:

root1 = [x], root2 = [x]

Output:

true

Example 2:



Input:

root1 = [+ , a , + , null , null , b , c] , root2 = [+ , + , a , b , c]

Output:

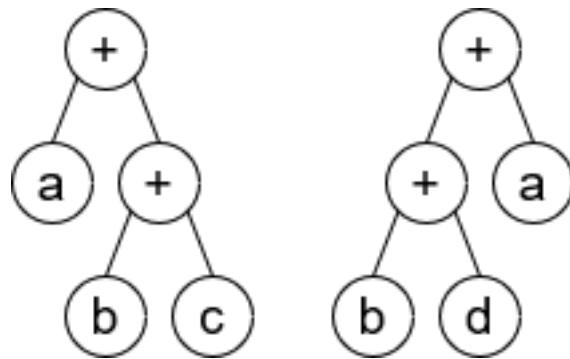
true

Explanation

:

$$a + (b + c) == (b + c) + a$$

Example 3:



Input:

```
root1 = [+ , a , + , null , null , b , c], root2 = [+ , + , a , b , d]
```

Output:

false

Explanation

:

$$a + (b + c) != (b + d) + a$$

Constraints:

The number of nodes in both trees are equal, odd and, in the range

[1, 4999]

Node.val

is

'+'

or a lower-case English letter.

It's

guaranteed

that the tree given is a valid binary expression tree.

Follow up:

What will you change in your solution if the tree also supports the

'-'

operator (i.e. subtraction)?

Code Snippets

C++:

```
/*
 * Definition for a binary tree node.
 * struct Node {
 *     char val;
 *     Node *left;
 *     Node *right;
 *     Node() : val(' '), left(nullptr), right(nullptr) {}
 *     Node(char x) : val(x), left(nullptr), right(nullptr) {}
 *     Node(char x, Node *left, Node *right) : val(x), left(left), right(right) {}
 * };
 */
```

```

class Solution {
public:
bool checkEquivalence(Node* root1, Node* root2) {

}
};

```

Java:

```

/**
 * Definition for a binary tree node.
 * class Node {
 * char val;
 * Node left;
 * Node right;
 * Node() {this.val = ' ';}
 * Node(char val) { this.val = val; }
 * Node(char val, Node left, Node right) {
 * this.val = val;
 * this.left = left;
 * this.right = right;
 * }
 * }
 */
class Solution {
public boolean checkEquivalence(Node root1, Node root2) {

}
}

```

Python3:

```

# Definition for a binary tree node.
# class Node(object):
# def __init__(self, val=" ", left=None, right=None):
# self.val = val
# self.left = left
# self.right = right
class Solution:
def checkEquivalence(self, root1: 'Node', root2: 'Node') -> bool:

```

Python:

```

# Definition for a binary tree node.
# class Node(object):
#     def __init__(self, val=" ", left=None, right=None):
#         self.val = val
#         self.left = None
#         self.right = None
class Solution(object):
    def checkEquivalence(self, root1, root2):
        """
:type root1: Node
:type root2: Node
:rtype: bool
"""

```

JavaScript:

```

/**
 * Definition for a binary tree node.
 * function Node(val, left, right) {
 *     this.val = (val==undefined ? " " : val)
 *     this.left = (left==undefined ? null : left)
 *     this.right = (right==undefined ? null : right)
 * }
 */
/**
 * @param {Node} root1
 * @param {Node} root2
 * @return {boolean}
 */
var checkEquivalence = function(root1, root2) {

};

```

C#:

```

/**
 * Definition for a binary tree node.
 * public class Node {
 *     public char val;
 *     public Node left;
 *     public Node right;
 *     public Node(char val=' ', TreeNode left=null, TreeNode right=null) {
 *         this.val = val;
 *     }
 * }

```

```

* this.left = left;
* this.right = right;
* }
* }
*/
public class Solution {
public bool CheckEquivalence(Node root1, Node root2) {

}
}

```

Solutions

C++ Solution:

```

/*
 * Problem: Check If Two Expression Trees are Equivalent
 * Difficulty: Medium
 * Tags: tree, hash, search
 *
 * Approach: DFS or BFS traversal
 * Time Complexity: O(n) where n is number of nodes
 * Space Complexity: O(h) for recursion stack where h is height
 */

/**
 * Definition for a binary tree node.
 * struct Node {
 *     char val;
 *     Node *left;
 *     Node *right;
 *     Node() : val(' '), left(nullptr), right(nullptr) {
 *         // TODO: Implement optimized solution
 *         return 0;
 *     }
 *     Node(char x) : val(x), left(nullptr), right(nullptr) {
 *         // TODO: Implement optimized solution
 *         return 0;
 *     }
 *     Node(char x, Node *left, Node *right) : val(x), left(left), right(right) {

```

```

// TODO: Implement optimized solution
return 0;
}
* };
*/
class Solution {
public:
bool checkEquivalence(Node* root1, Node* root2) {

}
};


```

Java Solution:

```

/**
 * Problem: Check If Two Expression Trees are Equivalent
 * Difficulty: Medium
 * Tags: tree, hash, search
 *
 * Approach: DFS or BFS traversal
 * Time Complexity: O(n) where n is number of nodes
 * Space Complexity: O(h) for recursion stack where h is height
 */

/**
 * Definition for a binary tree node.
 * class Node {
 *     char val;
 *     Node left;
 *     Node right;
 *     Node() {this.val = ' ';}
 *     Node(char val) { this.val = val; }
 *     Node(char val, Node left, Node right) {
 *         this.val = val;
 *         this.left = left;
 *         this.right = right;
 *     }
 * }
 */
class Solution {
public boolean checkEquivalence(Node root1, Node root2) {

```

```
}
```

```
}
```

Python3 Solution:

```
"""
Problem: Check If Two Expression Trees are Equivalent
Difficulty: Medium
Tags: tree, hash, search

Approach: DFS or BFS traversal
Time Complexity: O(n) where n is number of nodes
Space Complexity: O(h) for recursion stack where h is height
"""

# Definition for a binary tree node.
# class Node(object):
#     def __init__(self, val=" ", left=None, right=None):
#         self.val = val
#         self.left = left
#         self.right = right
class Solution:
    def checkEquivalence(self, root1: 'Node', root2: 'Node') -> bool:
        # TODO: Implement optimized solution
        pass
```

Python Solution:

```
# Definition for a binary tree node.
# class Node(object):
#     def __init__(self, val=" ", left=None, right=None):
#         self.val = val
#         self.left = None
#         self.right = None
class Solution(object):
    def checkEquivalence(self, root1, root2):
        """
:type root1: Node
:type root2: Node
:rtype: bool
```

```
"""
```

JavaScript Solution:

```
/***
 * Problem: Check If Two Expression Trees are Equivalent
 * Difficulty: Medium
 * Tags: tree, hash, search
 *
 * Approach: DFS or BFS traversal
 * Time Complexity: O(n) where n is number of nodes
 * Space Complexity: O(h) for recursion stack where h is height
 */

/***
 * Definition for a binary tree node.
 * function Node(val, left, right) {
 *   this.val = (val==undefined ? " " : val)
 *   this.left = (left==undefined ? null : left)
 *   this.right = (right==undefined ? null : right)
 * }
 */
/***
 * @param {Node} root1
 * @param {Node} root2
 * @return {boolean}
 */
var checkEquivalence = function(root1, root2) {

};
```

C# Solution:

```
/*
 * Problem: Check If Two Expression Trees are Equivalent
 * Difficulty: Medium
 * Tags: tree, hash, search
 *
 * Approach: DFS or BFS traversal
 * Time Complexity: O(n) where n is number of nodes
 * Space Complexity: O(h) for recursion stack where h is height
```

```
*/  
  
/**  
 * Definition for a binary tree node.  
 *  
 * public class Node {  
 *     public char val;  
 *     public Node left;  
 *     public Node right;  
 *     public Node(char val=' ', TreeNode left=null, TreeNode right=null) {  
 *         this.val = val;  
 *         this.left = left;  
 *         this.right = right;  
 *     }  
 * }  
 */  
  
public class Solution {  
    public boolean CheckEquivalence(TreeNode root1, TreeNode root2) {  
        }  
    }  
}
```