

# Problem 1161: Maximum Level Sum of a Binary Tree

## Problem Information

Difficulty: Medium

Acceptance Rate: 0.00%

Paid Only: No

## Problem Description

Given the

root

of a binary tree, the level of its root is

1

, the level of its children is

2

, and so on.

Return the

smallest

level

x

such that the sum of all the values of nodes at level

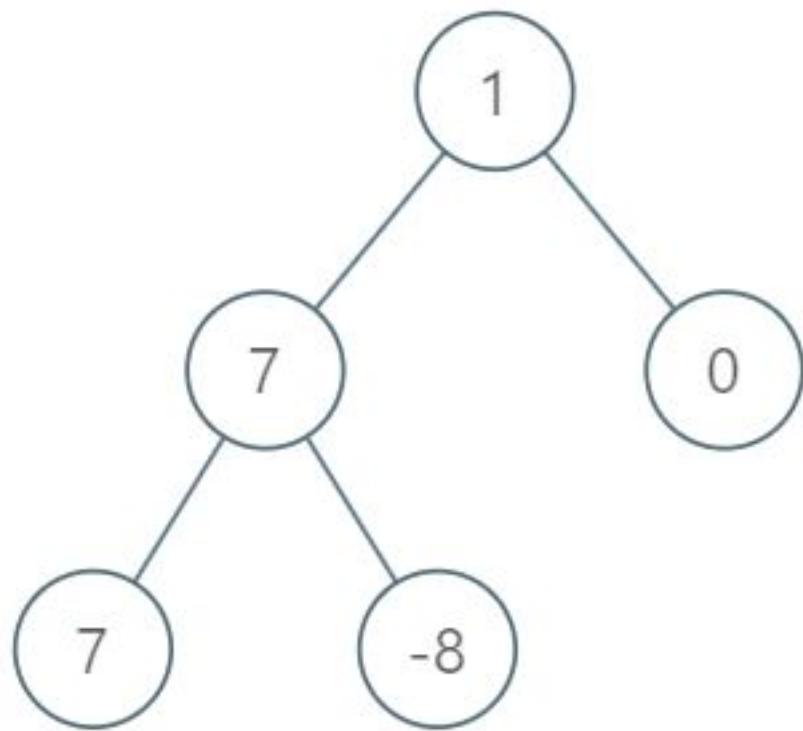
x

is

maximal

.

Example 1:



Input:

root = [1,7,0,7,-8,null,null]

Output:

2

Explanation:

Level 1 sum = 1. Level 2 sum =  $7 + 0 = 7$ . Level 3 sum =  $7 + -8 = -1$ . So we return the level with the maximum sum which is level 2.

Example 2:

Input:

```
root = [989,null,10250,98693,-89388,null,null,null,-32127]
```

Output:

```
2
```

Constraints:

The number of nodes in the tree is in the range

```
[1, 10
```

```
4
```

```
]
```

```
.
```

```
-10
```

```
5
```

```
<= Node.val <= 10
```

```
5
```

## Code Snippets

**C++:**

```
/*
 * Definition for a binary tree node.
 * struct TreeNode {
 *     int val;
 *
```

```

* TreeNode *left;
* TreeNode *right;
* TreeNode() : val(0), left(nullptr), right(nullptr) {}
* TreeNode(int x) : val(x), left(nullptr), right(nullptr) {}
* TreeNode(int x, TreeNode *left, TreeNode *right) : val(x), left(left),
right(right) {}
* };
*/
class Solution {
public:
int maxLevelSum(TreeNode* root) {

}
};

```

### 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 int maxLevelSum(TreeNode root) {

}
}

```

### Python3:

```

# 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 maxLevelSum(self, root: Optional[TreeNode]) -> int:
```

## Python:

```
# Definition for a binary tree node.
# class TreeNode(object):
#     def __init__(self, val=0, left=None, right=None):
#         self.val = val
#         self.left = left
#         self.right = right
class Solution(object):
    def maxLevelSum(self, root):
        """
:type root: Optional[TreeNode]
:rtype: int
"""


```

## 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 maxLevelSum = function(root) {

};
```

## TypeScript:

```

    /**
 * Definition for a binary tree node.
 * class TreeNode {
 * val: number
 * left: TreeNode | null
 * right: TreeNode | null
 * constructor(val?: number, left?: TreeNode | null, right?: TreeNode | null)
 *
 * this.val = (val===undefined ? 0 : val)
 * this.left = (left===undefined ? null : left)
 * this.right = (right===undefined ? null : right)
 *
 * }
 *
 */
function maxLevelSum(root: TreeNode | null): number {
}

```

### C#:

```

    /**
 * Definition for a binary tree node.
 * public class TreeNode {
 * public int val;
 * public TreeNode left;
 * public TreeNode right;
 * public TreeNode(int val=0, TreeNode left=null, TreeNode right=null) {
 * this.val = val;
 * this.left = left;
 * this.right = right;
 * }
 *
 * }
 *
 */
public class Solution {
public int MaxLevelSum(TreeNode root) {

}
}

```

### C:

```

/**
 * Definition for a binary tree node.
 * struct TreeNode {
 *     int val;
 *     struct TreeNode *left;
 *     struct TreeNode *right;
 * };
 */
int maxLevelSum(struct TreeNode* root) {
}

```

## Go:

```

/**
 * Definition for a binary tree node.
 * type TreeNode struct {
 *     Val int
 *     Left *TreeNode
 *     Right *TreeNode
 * }
 */
func maxLevelSum(root *TreeNode) int {
}

```

## Kotlin:

```

/**
 * Example:
 * var ti = TreeNode(5)
 * var v = ti.`val`
 * Definition for a binary tree node.
 * class TreeNode(var `val`: Int) {
 *     var left: TreeNode? = null
 *     var right: TreeNode? = null
 * }
 */
class Solution {
    fun maxLevelSum(root: TreeNode?): Int {
}

```

## Swift:

```
/**
 * Definition for a binary tree node.
 * public class TreeNode {
 *     public var val: Int
 *     public var left: TreeNode?
 *     public var right: TreeNode?
 *     public init() { self.val = 0; self.left = nil; self.right = nil; }
 *     public init(_ val: Int) { self.val = val; self.left = nil; self.right = nil; }
 *     public init(_ val: Int, _ left: TreeNode?, _ right: TreeNode?) {
 *         self.val = val
 *         self.left = left
 *         self.right = right
 *     }
 * }
 */
class Solution {
    func maxLevelSum(_ root: TreeNode?) -> Int {
}
```

## Rust:

```
// Definition for a binary tree node.
// #[derive(Debug, PartialEq, Eq)]
// pub struct TreeNode {
//     pub val: i32,
//     pub left: Option<Rc<RefCell<TreeNode>>,
//     pub right: Option<Rc<RefCell<TreeNode>>,
// }
//
// impl TreeNode {
//     #[inline]
//     pub fn new(val: i32) -> Self {
//         TreeNode {
//             val,
//             left: None,
//             right: None
//         }
//     }
// }
```

```

    // }
    // }

use std::rc::Rc;
use std::cell::RefCell;
impl Solution {
pub fn max_level_sum(root: Option<Rc<RefCell<TreeNode>>>) -> i32 {
}
}

```

## Ruby:

```

# Definition for a binary tree node.
# class TreeNode
# attr_accessor :val, :left, :right
# def initialize(val = 0, left = nil, right = nil)
#   @val = val
#   @left = left
#   @right = right
# end
# end
# @param {TreeNode} root
# @return {Integer}
def max_level_sum(root)

end

```

## PHP:

```

/**
 * Definition for a binary tree node.
 * class TreeNode {
 *   public $val = null;
 *   public $left = null;
 *   public $right = null;
 *   function __construct($val = 0, $left = null, $right = null) {
 *     $this->val = $val;
 *     $this->left = $left;
 *     $this->right = $right;
 *   }
 * }
 */

```

```

class Solution {

    /**
     * @param TreeNode $root
     * @return Integer
     */
    function maxLevelSum($root) {

    }
}

```

### Dart:

```

/***
 * Definition for a binary tree node.
 * class TreeNode {
 * int val;
 * TreeNode? left;
 * TreeNode? right;
 * TreeNode([this.val = 0, this.left, this.right]);
 * }
 */
class Solution {
int maxLevelSum(TreeNode? root) {

}
}

```

### Scala:

```

/**
 * Definition for a binary tree node.
 * class TreeNode(_value: Int = 0, _left: TreeNode = null, _right: TreeNode =
null) {
 * var value: Int = _value
 * var left: TreeNode = _left
 * var right: TreeNode = _right
 * }
 */
object Solution {
def maxLevelSum(root: TreeNode): Int = {

```

```
}
```

```
}
```

### Elixir:

```
# Definition for a binary tree node.  
#  
# defmodule TreeNode do  
#   @type t :: %__MODULE__{  
#     val: integer,  
#     left: TreeNode.t() | nil,  
#     right: TreeNode.t() | nil  
#   }  
#   defstruct val: 0, left: nil, right: nil  
# end  
  
defmodule Solution do  
  @spec max_level_sum(root :: TreeNode.t | nil) :: integer  
  def max_level_sum(root) do  
  
  end  
end
```

### Erlang:

```
%% Definition for a binary tree node.  
%%  
%% -record(tree_node, {val = 0 :: integer(),  
%%   left = null :: 'null' | #tree_node{},  
%%   right = null :: 'null' | #tree_node{}}).  
  
-spec max_level_sum(Root :: #tree_node{} | null) -> integer().  
max_level_sum(Root) ->  
.
```

### Racket:

```
; Definition for a binary tree node.  
#|  
  
; val : integer?  
; left : (or/c tree-node? #f)
```

```

; right : (or/c tree-node? #f)
(struct tree-node
  (val left right) #:mutable #:transparent)

; constructor
(define (make-tree-node [val 0])
  (tree-node val #f #f))

| #

(define/contract (max-level-sum root)
  (-> (or/c tree-node? #f) exact-integer?))
)

```

## Solutions

### C++ Solution:

```

/*
 * Problem: Maximum Level Sum of a Binary Tree
 * Difficulty: Medium
 * Tags: tree, 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 TreeNode {
 *     int val;
 *     TreeNode *left;
 *     TreeNode *right;
 *     TreeNode() : val(0), left(nullptr), right(nullptr) {
 *         // TODO: Implement optimized solution
 *         return 0;
 *     }
 *     TreeNode(int x) : val(x), left(nullptr), right(nullptr) {
 *         // TODO: Implement optimized solution
 *     }
 */

```

```

        return 0;
    }
* TreeNode(int x, TreeNode *left, TreeNode *right) : val(x), left(left),
right(right) {
// TODO: Implement optimized solution
return 0;
}
* };
*/
class Solution {
public:
int maxLevelSum(TreeNode* root) {

}
};


```

### Java Solution:

```

/**
* Problem: Maximum Level Sum of a Binary Tree
* Difficulty: Medium
* Tags: tree, 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 TreeNode {
* int val;
* TreeNode left;
* TreeNode right;
* TreeNode() {
// TODO: Implement optimized solution
return 0;
}
* 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 int maxLevelSum(TreeNode root) {

}
}

```

### Python3 Solution:

```

"""
Problem: Maximum Level Sum of a Binary Tree
Difficulty: Medium
Tags: tree, 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 TreeNode:
#     def __init__(self, val=0, left=None, right=None):
#         self.val = val
#         self.left = left
#         self.right = right
class Solution:

    def maxLevelSum(self, root: Optional[TreeNode]) -> int:
        # TODO: Implement optimized solution
        pass

```

### Python Solution:

```

# Definition for a binary tree node.
# class TreeNode(object):
#     def __init__(self, val=0, left=None, right=None):
#         self.val = val
#         self.left = left

```

```

# self.right = right
class Solution(object):
    def maxLevelSum(self, root):
        """
:type root: Optional[TreeNode]
:rtype: int
"""

```

### JavaScript Solution:

```

/**
 * Problem: Maximum Level Sum of a Binary Tree
 * Difficulty: Medium
 * Tags: tree, 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 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 maxLevelSum = function(root) {

};


```

### TypeScript Solution:

```

/**
 * Problem: Maximum Level Sum of a Binary Tree
 * Difficulty: Medium

```

```

* Tags: tree, 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 TreeNode {
* val: number
* left: TreeNode | null
* right: TreeNode | null
* constructor(val?: number, left?: TreeNode | null, right?: TreeNode | null)
{
* this.val = (val==undefined ? 0 : val)
* this.left = (left==undefined ? null : left)
* this.right = (right==undefined ? null : right)
* }
* }
*/

```

```

function maxLevelSum(root: TreeNode | null): number {
}

```

## C# Solution:

```

/*
* Problem: Maximum Level Sum of a Binary Tree
* Difficulty: Medium
* Tags: tree, 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 TreeNode {

```

```

* public int val;
* public TreeNode left;
* public TreeNode right;
* public TreeNode(int val=0, TreeNode left=null, TreeNode right=null) {
*     this.val = val;
*     this.left = left;
*     this.right = right;
* }
* }
*/
public class Solution {
    public int MaxLevelSum(TreeNode root) {

    }
}

```

## C Solution:

```

/*
 * Problem: Maximum Level Sum of a Binary Tree
 * Difficulty: Medium
 * Tags: tree, 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 TreeNode {
 *     int val;
 *     struct TreeNode *left;
 *     struct TreeNode *right;
 * };
 */
int maxLevelSum(struct TreeNode* root) {

}

```

## Go Solution:

```

// Problem: Maximum Level Sum of a Binary Tree
// Difficulty: Medium
// Tags: tree, 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.
 * type TreeNode struct {
 *     Val int
 *     Left *TreeNode
 *     Right *TreeNode
 * }
 */
func maxLevelSum(root *TreeNode) int {

}

```

## Kotlin Solution:

```

/**
 * Example:
 * var ti = TreeNode(5)
 * var v = ti.`val`
 *
 * Definition for a binary tree node.
 * class TreeNode(var `val`: Int) {
 *     var left: TreeNode? = null
 *     var right: TreeNode? = null
 * }
 */
class Solution {
    fun maxLevelSum(root: TreeNode?): Int {

    }
}

```

## Swift Solution:

```

/**
 * Definition for a binary tree node.
 *
```

```

* public class TreeNode {
*   public var val: Int
*   public var left: TreeNode?
*   public var right: TreeNode?
*   public init() { self.val = 0; self.left = nil; self.right = nil; }
*   public init(_ val: Int) { self.val = val; self.left = nil; self.right =
nil; }
*   public init(_ val: Int, _ left: TreeNode?, _ right: TreeNode?) {
*     self.val = val
*     self.left = left
*     self.right = right
*   }
* }
*
class Solution {
  func maxLevelSum(_ root: TreeNode?) -> Int {
}
}

```

### Rust Solution:

```

// Problem: Maximum Level Sum of a Binary Tree
// Difficulty: Medium
// Tags: tree, 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.
// #[derive(Debug, PartialEq, Eq)]
// pub struct TreeNode {
//   pub val: i32,
//   pub left: Option<Rc<RefCell<TreeNode>>,
//   pub right: Option<Rc<RefCell<TreeNode>>,
// }
//
// impl TreeNode {
//   #[inline]
//   pub fn new(val: i32) -> Self {

```

```

// TreeNode {
// val,
// left: None,
// right: None
// }
// }
// }

use std::rc::Rc;
use std::cell::RefCell;
impl Solution {
pub fn max_level_sum(root: Option<Rc<RefCell<TreeNode>>>) -> i32 {

}
}

```

### Ruby Solution:

```

# Definition for a binary tree node.
# class TreeNode
# attr_accessor :val, :left, :right
# def initialize(val = 0, left = nil, right = nil)
#   @val = val
#   @left = left
#   @right = right
# end
# end
# @param {TreeNode} root
# @return {Integer}
def max_level_sum(root)

end

```

### PHP Solution:

```

/**
 * Definition for a binary tree node.
 * class TreeNode {
 *   public $val = null;
 *   public $left = null;
 *   public $right = null;
 *   function __construct($val = 0, $left = null, $right = null) {

```

```

* $this->val = $val;
* $this->left = $left;
* $this->right = $right;
* }
* }
*/
class Solution {

/**
* @param TreeNode $root
* @return Integer
*/
function maxLevelSum($root) {

}
}

```

### Dart Solution:

```

/**
* Definition for a binary tree node.
* class TreeNode {
* int val;
* TreeNode? left;
* TreeNode? right;
* TreeNode([this.val = 0, this.left, this.right]);
* }
*/
class Solution {
int maxLevelSum(TreeNode? root) {

}
}

```

### Scala Solution:

```

/**
* Definition for a binary tree node.
* class TreeNode(_value: Int = 0, _left: TreeNode = null, _right: TreeNode =
null) {
* var value: Int = _value

```

```

* var left: TreeNode = _left
* var right: TreeNode = _right
* }
*/
object Solution {
def maxLevelSum(root: TreeNode): Int = {

}
}

```

### Elixir Solution:

```

# Definition for a binary tree node.
#
# defmodule TreeNode do
# @type t :: %__MODULE__{
#   val: integer,
#   left: TreeNode.t() | nil,
#   right: TreeNode.t() | nil
# }
# defstruct val: 0, left: nil, right: nil
# end

defmodule Solution do
@spec max_level_sum(root :: TreeNode.t | nil) :: integer
def max_level_sum(root) do

end
end

```

### Erlang Solution:

```

%% Definition for a binary tree node.
%%
%% -record(tree_node, {val = 0 :: integer(),
%%   left = null :: 'null' | #tree_node{},
%%   right = null :: 'null' | #tree_node{}}).

-spec max_level_sum(Root :: #tree_node{} | null) -> integer().
max_level_sum(Root) ->
.
```

### Racket Solution:

```
; Definition for a binary tree node.  
#|  
  
; val : integer?  
; left : (or/c tree-node? #f)  
; right : (or/c tree-node? #f)  
(struct tree-node  
(val left right) #:mutable #:transparent)  
  
; constructor  
(define (make-tree-node [val 0])  
(tree-node val #f #f))  
  
|#  
  
(define/contract (max-level-sum root)  
(-> (or/c tree-node? #f) exact-integer?)  
)
```