Problem 3241: Time Taken to Mark All Nodes

Problem Information

Difficulty: Hard
Acceptance Rate: 26.62%
Paid Only: No
Tags: Dynamic Programming, Tree, Depth-First Search, Graph

Problem Description

There exists an **undirected** tree with `n` nodes numbered `0` to `n - 1`. You are given a 2D integer array `edges` of length `n - 1`, where `edges[i] = [ui, vi]` indicates that there is an edge between nodes `ui` and `vi` in the tree.

Initially, **all** nodes are **unmarked**. For each node `i`:

* If `i` is odd, the node will get marked at time `x` if there is **at least** one node _adjacent_ to it which was marked at time `x - 1`. * If `i` is even, the node will get marked at time `x` if there is **at least** one node _adjacent_ to it which was marked at time `x - 2`.

Return an array `times` where `times[i]` is the time when all nodes get marked in the tree, if you mark node `i` at time `t = 0`.

Note that the answer for each `times[i]` is **independent** , i.e. when you mark node `i` all other nodes are _unmarked_.

Example 1:

Input: edges = [[0,1],[0,2]]

Output: [2,4,3]

Explanation:

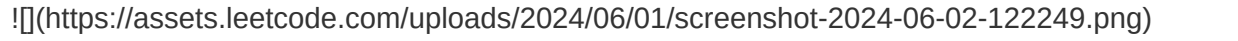
* For `i = 0`: * Node 1 is marked at `t = 1`, and Node 2 at `t = 2`. * For `i = 1`: * Node 0 is marked at `t = 2`, and Node 2 at `t = 4`. * For `i = 2`: * Node 0 is marked at `t = 2`, and Node 1 at `t = 3`.

Example 2:

Input: edges = [[0,1]]

Output: [1,2]

Explanation:



* For `i = 0`: * Node 1 is marked at `t = 1`. * For `i = 1`: * Node 0 is marked at `t = 2`.

Example 3:

Input: edges = [[2,4],[0,1],[2,3],[0,2]]

Output: [4,6,3,5,5]

Explanation:

Constraints:

* `2 <= n <= 105` * `edges.length == n - 1` * `edges[i].length == 2` * `0 <= edges[i][0], edges[i][1] <= n - 1` * The input is generated such that `edges` represents a valid tree.

Code Snippets

C++:

```
class Solution {
public:
vector<int> timeTaken(vector<vector<int>>& edges) {
```

```
}
};
```

Java:

```
class Solution {
public int[] timeTaken(int[][] edges) {

}
}
```

Python3:

```
class Solution:
def timeTaken(self, edges: List[List[int]]) -> List[int]:
```