Problem 3558: Number of Ways to Assign Edge Weights I

Problem Information

Difficulty: Medium
Acceptance Rate: 53.35%
Paid Only: No
Tags: Math, Tree, Depth-First Search

Problem Description

There is an undirected tree with `n` nodes labeled from 1 to `n`, rooted at node 1. The tree is represented by 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`.

Initially, all edges have a weight of 0. You must assign each edge a weight of either **1** or **2**.

The **cost** of a path between any two nodes `u` and `v` is the total weight of all edges in the path connecting them.

Select any one node `x` at the **maximum** depth. Return the number of ways to assign edge weights in the path from node 1 to `x` such that its total cost is **odd**.

Since the answer may be large, return it **modulo** `109 + 7`.

Note: Ignore all edges **not** in the path from node 1 to `x`.

Example 1:

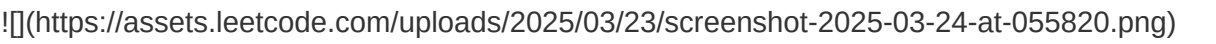
Input: edges = [[1,2]]

Output: 1

Explanation:

* The path from Node 1 to Node 2 consists of one edge (`1 -> 2`). * Assigning weight 1 makes the cost odd, while 2 makes it even. Thus, the number of valid assignments is 1.

Example 2:



Input: edges = [[1,2],[1,3],[3,4],[3,5]]

Output: 2

Explanation:

* The maximum depth is 2, with nodes 4 and 5 at the same depth. Either node can be selected for processing. * For example, the path from Node 1 to Node 4 consists of two edges (`1 -> 3` and `3 -> 4`). * Assigning weights (1,2) or (2,1) results in an odd cost. Thus, the number of valid assignments is 2.

Constraints:

* `2 <= n <= 105` * `edges.length == n - 1` * `edges[i] == [ui, vi]` * `1 <= ui, vi <= n` * `edges` represents a valid tree.

Code Snippets

C++:

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

}
};
```

Java:

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

}
}
```

Python3:

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