Problem 2973: Find Number of Coins to Place in Tree Nodes

Problem Information

Difficulty: Hard
Acceptance Rate: 36.96%
Paid Only: No
Tags: Dynamic Programming, Tree, Depth-First Search, Sorting, Heap (Priority Queue)

Problem Description

You are given an **undirected** tree with `n` nodes labeled from `0` to `n - 1`, and rooted at node `0`. You are given a 2D integer array `edges` of length `n - 1`, where `edges[i] = [ai, bi]` indicates that there is an edge between nodes `ai` and `bi` in the tree.

You are also given a **0-indexed** integer array `cost` of length `n`, where `cost[i]` is the **cost** assigned to the `ith` node.

You need to place some coins on every node of the tree. The number of coins to be placed at node `i` can be calculated as:

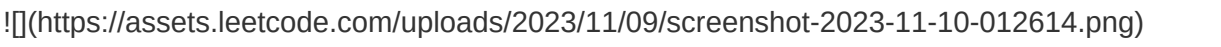
* If size of the subtree of node `i` is less than `3`, place `1` coin. * Otherwise, place an amount of coins equal to the **maximum** product of cost values assigned to `3` distinct nodes in the subtree of node `i`. If this product is **negative** , place `0` coins.

Return _an array_`coin` _of size_`n` _such that_`coin[i]`_is the number of coins placed at node_`i` _._

Example 1:

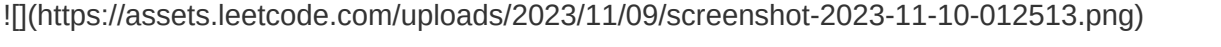
Input: edges = [[0,1],[0,2],[0,3],[0,4],[0,5]], cost = [1,2,3,4,5,6] **Output:** [120,1,1,1,1,1] **Explanation:** For node 0 place 6 * 5 * 4 = 120 coins. All other nodes are leaves with subtree of size 1, place 1 coin on each of them.

Example 2:



Input: edges = [[0,1],[0,2],[1,3],[1,4],[1,5],[2,6],[2,7],[2,8]], cost = [1,4,2,3,5,7,8,-4,2] **Output:** [280,140,32,1,1,1,1,1,1] **Explanation:** The coins placed on each node are: - Place 8 * 7 * 5 = 280 coins on node 0. - Place 7 * 5 * 4 = 140 coins on node 1. - Place 8 * 2 * 2 = 32 coins on node 2. - All other nodes are leaves with subtree of size 1, place 1 coin on each of them.

Example 3:



Input: edges = [[0,1],[0,2]], cost = [1,2,-2] **Output:** [0,1,1] **Explanation:** Node 1 and 2 are leaves with subtree of size 1, place 1 coin on each of them. For node 0 the only possible product of cost is 2 * 1 * -2 = -4. Hence place 0 coins on node 0.

Constraints:

* `2 <= n <= 2 * 104` * `edges.length == n - 1` * `edges[i].length == 2` * `0 <= ai, bi < n` * `cost.length == n` * `1 <= |cost[i]| <= 104` * The input is generated such that `edges` represents a valid tree.

Code Snippets

C++:

```
class Solution {
public:
vector<long long> placedCoins(vector<vector<int>>& edges, vector<int>& cost)
{

}
};
```

Java:

```
class Solution {
public long[] placedCoins(int[][] edges, int[] cost) {
```

```
}
}
```

Python3:

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