12371 - LAB 04

Instructions

1. Access the auto-grader at https://c200.luddy.indiana.edu
2. Please write the code for the problems in python language
3. The code should be readable with variables named meaningfully
4. Plagiarism is unacceptable and we have ways to find it, so do not do it
5. Don't change the function signature (name of the function and number and types of arguments) provided in this file.
6. Once you pass all the tests on the auto grader, show your work to the teaching assistant

Problem

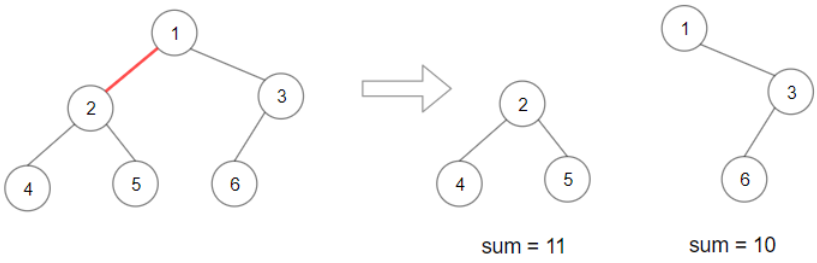
Question

In Gotham City, a notorious villain named EdgeMaster has trapped our favorite superheroes, BinaryMan and ModuloGirl, in a binary tree maze called the "Arkham Asylum." To free them, you must create an algorithm that strategically removes a single edge, splitting the tree into two subtrees. The catch is, the product of the sums of these subtrees needs to be maximized, and the result must be returned modulo $10^9 + 7$.

Your coding skills are the heroes Gotham city needs! Can you rescue BinaryMan and ModuloGirl by finding an optimal algorithm ? The fate of Gotham City rests in your hands!

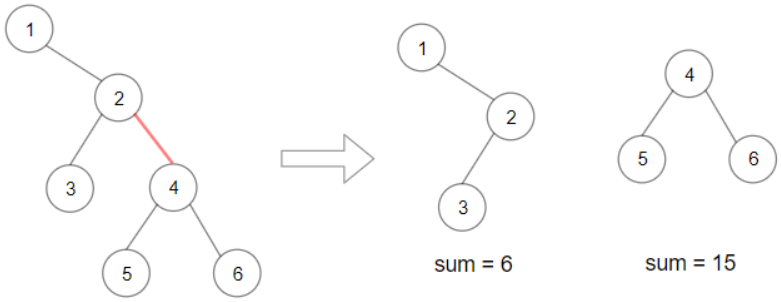
Test cases

Example 1:



Input: root = [1, 2, 3, 4, 5, 6]
Output: 110
Explanation: Remove the red edge and get 2 binary trees with sum 11 and 10.
Their product is 110 (11*10)

Example 2:



Input: root = [1, null, 2, 3, 4, null, null, 5, 6]
Output: 90
Explanation: Remove the red edge and get 2 binary trees with sum 15 and 6.
Their product is 90 (15*6)

Function signature

```
class TreeNode:
    def __init__(self, val=0, left=None, right=None):
        self.val = val
        self.left = left
        self.right = right

def max_split_prod(root):
```