You work for an MNC named Casper Inc. The management at Casper Inc. has decided to implement a security system to ensure the safety of its female employees. They have created a rooted binary tree T having N nodes numbered

from 0 to N-1, where 0 is the root. Each node in T denotes a female passenger in a shift who is availing the carpool service provided by Casper Inc. You make three arrays for this tree: A, B and C such that

A is the preorder traversal of T, B is the inorder traversal of T and C is the postorder traversal of T. Each of these arrays A, B and C represent the order in which these employees are assigned a carpool

for going home. In order to ensure that the women do not have to wait too long the system has a default maximum wait time for carpool assignment equal to sum(median(A_i,B_i,C_i) over all i from 0

to N-1 modulo 10^9+7.

Write a program to calculate default maximum wait time for carpool assignment.

A tree is an undirected connected graph, consisting of N vertices and M=N-1 edges. A preorder traversal consists of considering the parent before the children. A postorder traversal consists of

considering the children before the parent, while an inorder traversal consists of considering the left child, then the parent and finally the right child.

Note, that due to the deterministic nature of the traversals, the arrays A, B and C are guaranteed to be unique. You are given the parent array having M elements as input. It is guaranteed that the array represents a rooted binary tree. In

particular each node has at most 2 children. Also, if there are 2 children of a node, consider the left node to be the smaller numbered node out of the two children and right node to be the higher

numbered node among them. If a node has a single child, consider it to be the left child of the node.

Graphs for sample case 1 and 2:
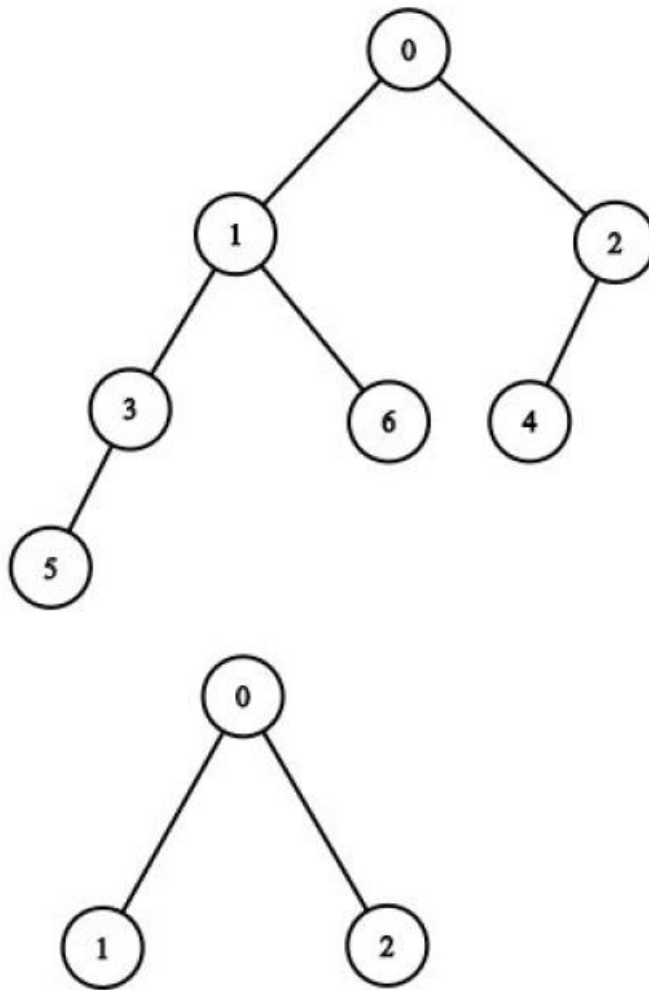
Function Description

Create a function as per the below description. It has the following parameter(s):

Parameters:

Name	Type	Description
parent	INTEGER ARRAY	parent array

Return:

The function must return an INTEGER denoting the Default maximum wait time for carpool assignment.

Constraints:

$0 \leq M \leq 10^3$

$0 \leq parent[i] \leq 10^3$

Input Format:

The first line contains an integer, M, denoting the number of elements in parent.

Each line i of the M subsequent lines (where $0 \leq i < M$) contains an integer describing parent[i].

Output Format:

Output an INTEGER denoting the Default maximum wait time for carpool assignment.

Sample Case 0

Sample Input for Custom Testing

6

0

0

1

2

3

1

Sample Output

24

Sample Output Explanation:

Given number of edges = M = 6.

Number of nodes = 7.

Check graph image 1 above.

Preorder traversal = A = [0 1 3 5 6 2 4].

Inorder traversal = B = [: 5 3 1 6 0 4 2].

Postorder traversal = C = [5 3 6 1 4 2 0].

Medians = [5 3 3 5 4 2 2].

Sum = 24.

Sample Case 1

Sample Input for Custom Testing

2

0

0

Sample Output

4

Sample Output Explanation

Given M=2, N=3. Check graph image 2 above. A=[0,1,2], B=

[1,0,2], C=[1,2,0]. Medians=[1,1,2]. Answer = 4.