

# Matrix Tree

Sevenkplus has a rooted tree with  $N$  vertices. The vertices are labeled from  $1$  to  $N$ .  $1$  is the root of the tree. Each vertex  $v$  has a weight  $W_v$ .  
He forms a  $N \times N$  matrix  $M$  from the tree.  $M$  is defined by

$$M(x,y) = W_{lca(x,y)}$$

where  $lca(x,y)$  is the lowest common ancestor of vertex  $x$  and vertex  $y$ .  
He wants to calculate the determinant of  $M$ .

### Input Format

First line contains the number of vertices,  $N$ .  
Second line contains  $N$  numbers,  $W_1 W_2 \cdots W_N$  separated by a space.  
This is followed by  $N - 1$  lines. Each line contains two numbers  $x, y$ , denoting that there is an edge between  $x$  and  $y$ .

### Output Format

Output one line, the determinant of  $M$  modulo  $(10^9 + 7)$ .

### Constraints

$$1 \leq N \leq 10^5$$
$$\forall i, 0 \leq W_i \leq 10^9.$$

### Sample Input

```
3
1 2 3
1 2
1 3
```

### Sample Output

```
2
```

### Explanation

$$M = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 3 \end{bmatrix}$$

Then,

$$|M| = 1 \times \begin{vmatrix} 2 & 1 \\ 1 & 3 \end{vmatrix} - 1 \times \begin{vmatrix} 1 & 1 \\ 1 & 3 \end{vmatrix} + 1 \times \begin{vmatrix} 1 & 2 \\ 1 & 1 \end{vmatrix}$$

.

Hence  $|M| = (1 \times 5) - (1 \times 2) + (1 \times -1) = 2$

### Timelimits

Timelimits for this challenge is given [here](#)