

Treemax

Rukfaš, *despite living there*, somehow got lost in Baščaršija! He needs your help to get out.

Baščaršija can be represented as a connected acyclic undirected graph with n nodes (a tree). Some nodes on the tree are labeled, while some aren't. It is guaranteed that all labels on the tree are distinct integers and in the range $[1, n]$.

It is well known in this version of Baščaršija that there is a simple way to calculate how easy it is to get lost. It is the sum, over all pairs of nodes, of the largest label on the path between them (path includes both the starting and ending node).

Formally, for two distinct nodes, define $cost(u, v)$ as the largest label on the path between node u and v , where the path includes both endpoints. Define "lostness" as how easy it is to get lost. The lostness of a tree is:

$$\sum_{1 \leq u < v \leq n} cost(u, v)$$

Baščaršija, in its current state, has some nodes without any label written. To help out Rukfaš, you must determine whether it is possible to label the unlabeled nodes such that the lostness is minimal among all $n!$ possible permutations of labels.

Formally, define min as the minimum lostness across all $n!$ permutations, ignoring the nodes with labels written.

Please help Rukfaš determine whether the unlabeled nodes can be filled in with the missing labels, so that all labels form a permutation of $1..n$, and the resulting lostness equals min .

Input

The first line contains T , the number of test cases.

The first line of each test case has n written on it.

The next line contains an array a consisting of n integers, where a_i represents which label is written on the i -th node, or 0 if nothing is written. It is guaranteed that all non-zero labels are distinct.

The next $n - 1$ lines contain two integers u, v , which represent an edge between the node with *index* u and node with *index* v .

Output

Output T lines and in each of them output YES (**case-sensitive!**) if it is possible to label nodes so that the lostness is minimized and NO otherwise.

Constraints

- $1 \leq T \leq 2 \cdot 10^5$
- $2 \leq n \leq 2 \cdot 10^5$
- $1 \leq u, v \leq n$
- $0 \leq a_i \leq n$
- For all $i < j$ such that $a_i \neq 0$ and $a_j \neq 0$, $a_i \neq a_j$
- Define S as the sum of n over all test cases. $S \leq 2 \cdot 10^5$

Subtasks

Subtask 1 (5 points)

$$S \leq 7$$

Subtask 2 (12 points)

$$S \leq 20$$

Subtask 3 (23 points)

$$S \leq 2000$$

Subtask 4 (18 points)

Some node has label 1.

Subtask 5 (10 points)

Every node has at most 10 neighbors.

Subtask 6 (32 points)

No additional constraints.

Examples

Input 1

```
2
3
3 1 2
1 3
1 2
3
0 1 0
1 2
2 3
```

Output 1

```
NO
YES
```

Explanation 1

The assignment in the first test case achieves 9, while the minimal lostness across all permutations of labels is equal to 8. One possible assignment for the second test case would be $a = [2, 1, 3]$. The lostness of this assignment is 8. It can be shown that it is impossible to achieve a lower lostness.

Input 2

```
1
15
4 0 0 0 6 0 0 0 14 0 0 0 0 0 11
1 2
2 3
2 4
2 5
1 6
6 7
7 8
8 9
1 10
10 11
11 12
12 13
13 14
14 15
```

Output 2

```
YES
```

Input 3

```
2
12
1 0 4 0 8 0 7 0 9 0 11 0
1 2
2 3
3 4
4 5
3 6
6 7
1 8
8 9
9 10
10 11
9 12
11
4 0 0 0 0 0 6 0 0 0 8
1 2
2 3
3 4
4 5
1 6
6 7
1 8
8 9
9 10
10 11
```

Output 3

```
YES
YES
```