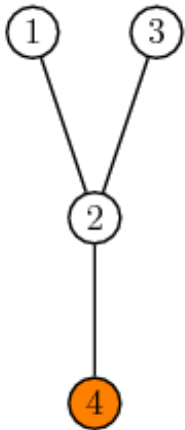


Play with a Tree

Hey, ACRush and Jelly are playing a game ! Let take a look at its rule:

You are given a tree. Two players take turns cutting edges on a tree. Some nodes is on the "ground". When a player cuts an edge, all the edges that are no longer connected to the ground disappear. The player who can not take a move loses.

ACRush plays first. Both of them are very good players. If you know state of the tree they are playing with, can you guess who will win?



Node 4 is on the ground.

Input

Input consists of multiple test-cases. The first line contains one integer t - number of cases ($0 < t \leq 20$). For each case, the input format is following. The first line contains one integer N ($1 \leq N \leq 100000$). The next line N integers $s[i]$ (1 or 0). If $s[i]$ is 1, the i -th node is on the ground. If $s[i]$ is 0, the i -th node is not on the ground. Each line of the following $N - 1$ lines contains two integers u, v . They denote there is an edge between node u and node v ($1 \leq u, v \leq N$).

There is no blank line after each case.

Output

For each case, output who will win the game. If ACRush wins, output 1; otherwise, output 0 (Jelly wins).

There is no blank line after each case.

Example

Input:

```
1
4
0 0 0 1
1 2
2 3
2 4
```

Output:

```
1
```