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# F. Skibidus and Slay

time limit per test: 4 seconds memory limit per test: 512 megabytes

Let's define the *majority* of a sequence of k elements as the unique value that appears strictly more than  $\left\lfloor \frac{k}{2} \right\rfloor$  times. If such a value does not exist, then the sequence does **not** have a majority. For example, the sequence [1,3,2,3,3] has a majority 3 because it appears  $3 > \left\lfloor \frac{5}{2} \right\rfloor = 2$  times, but [1,2,3,4,5] and [1,3,2,3,4] do not have a majority.

Skibidus found a tree\* of n vertices and an array a of length n. Vertex i has the value  $a_i$  written on it, where  $a_i$  is an integer in the range [1, n].

For each i from 1 to n, please determine if there exists a non-trivial simple path<sup>†</sup> such that i is the *majority* of the **sequence of integers written on the vertices** that form the path.

#### Input

Each test contains multiple test cases. The first line contains the number of test cases t (  $1 \le t \le 10^4$ ). The description of the test cases follows.

The first line of each test case contains a single integer n ( $2 \le n \le 5 \cdot 10^5$ ) — the number of vertices

The second line of each test case contains  $a_1, a_2, \ldots, a_n$   $(1 \le a_i \le n)$  — the integers written on the vertices.

Each of the next n-1 lines contains two integers  $u_i$  and  $v_i$ , denoting the two vertices connected by an edge  $(1 \le u_i, v_i \le n, u_i \ne v_i)$ .

It is guaranteed that the given edges form a tree.

It is guaranteed that the sum of *n* over all test cases does not exceed  $5 \cdot 10^5$ .

#### Output

For each test case, output a binary string s of length n on a separate line.  $s_i$  should be computed as follows:

- If there is a non-trivial path containing *i* as the majority, *s<sub>i</sub>* is '1';
- Otherwise,  $s_i$  is '0'.

## Example



# Codeforces Round 1003 (Div. 4) Finished

# Practice

# → Virtual participation

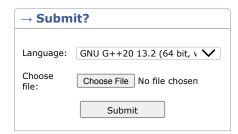
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Start virtual contest

# → Clone Contest to Mashup

You can clone this contest to a mashup.

Clone Contest



#### → Contest materials

- Announcement (en)
- Tutorial (en)

<sup>\*</sup>A tree is a connected graph without cycles.

 $<sup>^{\</sup>dagger}$ A sequence of vertices  $v_1, v_2, \ldots, v_m$  ( $m \geq 2$ ) forms a non-trivial simple path if  $v_i$  and  $v_{i+1}$  are connected by an edge for all  $1 \leq i \leq m-1$  and all  $v_i$  are pairwise distinct. **Note that the path must consist of at least** 2

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```
2 3
3 4
13
1 4 4 7 4 7 1 1 7 11 11 11 11
2 3
3 4
4 5
4 6
2 7
7 8
2 9
6 10
5 11
11 12
10 13
                                                                                  Сору
output
000
1010
0001
1001001000100
```

### Note

In the first test case, there is no non-trivial path with 1, 2, or 3 as a majority, so the binary string outputted is "000".

In the second test case,  $1 \rightarrow 2 \rightarrow 4$  is a non-trivial path with 3 as a majority.

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