Label Matching

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	1024 megabytes

Panda has a rooted tree with n nodes, where node 1 is the root. Each node i in the tree has two labels: a_i and b_i. Some of these values are designated as **wildcards**, which is represented by 0. Specifically, two values x and y are considered equal if $x = y$ or if at least one of them is a wildcard 0.

For a node i, let T_i denote the subtree rooted at node i, which consists of node i itself and all of its descendants in the tree. For each node i from 1 to n, Panda asks you the following question, and you must answer each one independently:

- You can perform any number of swap operations (including zero). In each operation, you can choose any two nodes u and v within the subtree T_i and swap a_u and a_v. Determine whether it is possible, using some sequence of swaps, to make a_k equal to b_k for all nodes k in the subtree T_i.

Note that each query is independent. The swaps you consider are only for that specific query and do not affect the initial state of the tree for subsequent queries.

Input

The first line contains a single integer T ($1 \le T \le 2 \times 10^5$), representing the number of test cases.

For each test case the first line contains a positive integer n ($1 \le n \le 2 \times 10^5$), indicating the number of nodes.

The second line contains n integers, the i-th of which is a_i ($0 \le a_i \le n$). If $a_i = 0$, it represents a wildcard.

The third line contains n integers, the i-th of which is b_i ($0 \le b_i \le n$). If $b_i = 0$, it represents a wildcard.

The next $n - 1$ lines describe the structure of the tree. Each line contains two integers u, v ($1 \le u, v \le n$, $u \ne v$), representing an edge between node u and node v. It is guaranteed that the given $n - 1$ edges form a tree.

The sum of n over all test cases is guaranteed to not exceed $2 \cdot 10^5$.

Output

For each test case, you must print a single line with a binary string s of length n. The i-th character of the string, s_i, should be 1 if a valid swap scheme exists for the subtree T_i, and 0 otherwise.

Example

standard input	standard output
3 6 1 5 0 3 4 0 0 3 4 5 2 0 1 2 2 3 2 4 1 5 5 6 5 2 2 3 0 4 4 1 4 2 0 1 2 2 3 3 4 4 5 3 1 2 3 3 2 1 1 2 2 3	111011 01111 100