Problem C. Count on a Tree II Striking Back

Input file:	*standard input*
Output file:	*standard output*
Time limit:	4 seconds
Memory limit:	512 mebibytes

You are given a tree with n nodes. The tree nodes are numbered from 1 to n. The color of the i-th node is col_i.

You need to perform m operations. Each operation is one of the following:

- "1 x y" ($1 \leq x, y \leq n$): Change the color of the x-th node into y.

- "2 a b c d" ($1 \leq a, b, c, d \leq n$): Let's denote $f(u, v)$ as the number of different colors which occur on the simple path from u to v. You need to answer whether $f(a, b) > f(c, d)$ is true.

Input

The first line contains a single integer T ($1 \leq T \leq 4$), the number of test cases. For each test case:

The first line contains two integers n and m ($1 \leq n \leq 500\,000$, $1 \leq m \leq 10\,000$), denoting the number of nodes and the number of operations.

The second line contains n integers $col_1, col_2, \ldots, col_n$ ($1 \leq col_i \leq n$) denoting the initial color of each node.

Each of the following $n - 1$ lines contains two integers u_i and v_i ($1 \leq u_i, v_i \leq n$, $u_i \neq v_i$) denoting a bidirectional edge between the u_i-th node and the v_i-th node.

Each of the next m lines describes an operation in formats described in the statement above, except that some parameters are encrypted in order to enforce online processing.

Let cnt be the number of queries that you answered "Yes" before in this test case. Note that cnt should be reset to 0 in each new test case. For each operation, x, y, a, b, c, and d are encrypted: their actual values are $x \oplus cnt$, $y \oplus cnt$, $a \oplus cnt$, $b \oplus cnt$, $c \oplus cnt$, and $d \oplus cnt$. In the expressions above, the symbol "$\oplus$" denotes the bitwise exclusive-or operation. Also note that the constraints described in the statement above apply to the corresponding parameters only after decryption, the encrypted values are not subject to those constraints.

It is guaranteed that $f(a, b) \geq 2f(c, d)$ or $f(c, d) \geq 2f(a, b)$ always holds for each query.

Output

For each query, print a single line. If $f(a, b) > f(c, d)$ is true, print "Yes". Otherwise, print "No".

Example

standard input	standard output
1	Yes
8 4	No
1 2 1 4 1 3 3 2	Yes
1 2	
2 3	
3 4	
3 5	
1 6	
6 7	
6 8	
2 1 4 3 5	
2 7 6 5 9	
1 4 9	
2 2 4 7 6	