I Will Always Remember You

Input file:	`standard input`
Output file:	`standard output`
Time limit:	8 seconds
Memory limit:	1024 megabytes

Given a directed acyclic graph G with n vertices and m edges, and a color sequence $a_1, a_2, \cdots, a_n$ of length n, where a_i denotes the initial color of vertex i.

Let S_i denote the set of all vertices reachable from vertex i in graph G (including vertex i itself).

Now, you need to process q operations in order. The operations are of the following two types:

- Given x and y, change the color a_x of vertex x to y.
- Given x, query the number of distinct colors among all vertices reachable from vertex x. That is, find the size of the set $\{a_j \mid j \in S_x\}$.

Input

The first line contains two integers n, m ($1 \le n \le 1.5 \times 10^5$, $0 \le m \le 3 \times 10^5$), representing the number of vertices and the number of edges in the graph, respectively.

The second line contains n integers $a_1, a_2, \cdots, a_n$ ($1 \le a_i \le n$), representing the initial color of each vertex.

The next m lines each contain two integers u, v ($1 \le u, v \le n$), indicating that there is a directed edge from u to v in graph G. It is guaranteed that graph G is a directed acyclic graph (DAG) and contains no multiple edges.

The next line contains an integer q ($1 \le q \le 1.5 \times 10^5$), representing the total number of operations.

The next q lines each describe an operation in one of the following two formats:

- `1 x y`: Represents an update operation, changing the color a_x to y ($1 \le x, y \le n$).
- `2 x`: Represents a query operation, querying the number of distinct colors reachable from vertex x ($1 \le x \le n$).

Output

For each operation of the second type, output a single line containing an integer representing the answer to the query.

Example

standard input	standard output
9 14 8 4 2 3 5 2 2 4 7 3 5 8 9 4 5 5 8 6 8 3 8 1 4 2 9 2 4 2 8 1 3 7 9 1 8 5 7 10 1 6 4 1 3 3 2 1 2 3 1 4 3 1 8 5 1 8 7 2 7 2 2 2 9	6 5 2 5 1