Problem J. Just a game

Time limit: 4 seconds
Memory limit: 1024 mebibytes

There are n players, numbered from 1 to n, and m cards, numbered from 1 to m. Card i has an integer A_i written on it and is initially held by player B_i. A player may hold any number of cards, including none.

Players take turns in the order $1, 2, \ldots, n, 1, 2, \ldots$, with turns numbered starting from 1. In other words, player $((t-1) \bmod n) + 1$ acts in the t-th turn.

On player p's turn:

- If player p has no cards, player p loses and the game ends immediately.
- Otherwise, each card i held by player p is passed to the player holding card A_i at the start of the turn. If player p also holds card A_i, card i stays with player p. All transfers happen at once.

Y. Oh, a famous cheater, makes q updates to the array B to change the result of the game. Each update is specified by two integers j and b and replaces the current value of B_j with b. The updates are cumulative.

After each update, consider a new independent game starting from turn 1 with the updated array B. Output the number of the turn on which the game ends, or -1 if it never ends.

Input

The first line contains three integers n, m, and q — the number of players, the number of cards, and the number of updates, respectively.

The second line contains m integers $A_1, A_2, \ldots, A_m$, where A_i is the integer written on card i.

The third line contains m integers $B_1, B_2, \ldots, B_m$, indicating that card i is initially held by player B_i.

Each of the next q lines contains two integers j and b, describing an update that replaces the current value of B_j with b.

Output

For each update, print the number of the turn on which the game ends, or -1 if it never ends.

Constraints

- $1 \le n \le 1.5 \cdot 10^5$
- $1 \le m, q \le 3 \cdot 10^5$
- $1 \le A_i \le m$ $(1 \le i \le m)$
- $1 \le B_i \le n$ $(1 \le i \le m)$
- For every update, $1 \le j \le m$ and $1 \le b \le n$.

Example

standard input	standard output
3 4 5 2 3 4 1 2 2 3 1 1 2 1 1 1 3 3 2 4 2	4 -1 4 4 1

Note

After the first update in the example, players 1, 2, and 3 initially hold cards $\{4\}$, $\{1, 2\}$, and $\{3\}$, respectively. The game proceeds as follows:

- On turn 1, player 1 passes their only card, card 4, to player 2.
- On turn 2, player 2 keeps cards 1 and 4 and passes card 2 to player 3.
- On turn 3, player 3 keeps card 2 and passes card 3 to player 2.
- On turn 4, player 1 has no cards and loses.

Therefore, the answer is 4.

After the second update in the example, players 1, 2, and 3 initially hold cards $\{1, 4\}$, $\{2\}$, and $\{3\}$, respectively. The game never ends, so the answer is -1.