Pet Fair (exhibitions)

Edoardo and Luca decided to diversify their businesses by organizing an astounding *pet fair*. However, they are already fighting for its organization, since Luca is a huge fan of *dogs* and Edoardo a strong supporter of *cats*!

This fair consists in N different exhibitions, each of them with a specific *awesomeness coefficient* A_i (positive integer), involving a certain *pet* P_i (a dog or a cat), and presented by a certain *guide* G_i (a dog-lover or a cat-lover), for $i = 0 \ldots N-1$. Note that a cat exhibition is not necessarily presented by a cat-lover, and similarly for dogs.

Figure 1: Long-standing enemies confronting for the ultimate supremacy.

During the fair, M groups of tourists will arrive, starting from different exhibitions E_j for $j = 0 \ldots M-1$. The guides, after presenting their exhibition to the incoming group, will direct the group to another exhibition of their choice. The groups will continue to follow the instructions of the guides, until they will reach in this way an exhibition they have already seen: at that point, the group will leave the fair.

Edoardo and Luca know very well that, when a group leaves, only the most awesome exhibition encountered during the visit will be remembered... and they want this memory to be of their beloved pet! Edoardo and Luca are very smart, so they have developed the best possible strategies for their sides and have coordinated tactics with their fellow guides accordingly. Calculate which pet will be remembered by each incoming group, knowing that every guide will follow the best possible strategy for their side!

☞ Among the attachments of this task you may find a template file `exhibitions.*` with a sample incomplete implementation.

Input

The first line contains integers N and M. The second line contains M integers E_i. The following N lines contain three integers A_i, P_i, G_i each.

Output

You need to write a single line with M integers R_i, corresponding to the pet that will be remembered by each group, assuming a perfect strategy from both competing sides.

Constraints

- $2 \le N, M \le 100\,000$.
- $0 \le A_i \le 10^9$ for each $i = 0 \ldots N-1$.
- $0 \le E_i \le N-1$ for each $i = 0 \ldots M-1$.
- P_i, G_i, R_i can be 0 to indicate *dogs*, or 1 to indicate *cats*.
- The values A_i are all distinct.

Scoring

Your program will be tested against several test cases grouped in subtasks. In order to obtain the score of a subtask, your program needs to correctly solve all of its test cases.

- **Subtask 1** (0 points) Examples.
- **Subtask 2** (10 points) $N = 2$.
- **Subtask 3** (10 points) $N = 3$.
- **Subtask 4** (15 points) $N, M \leq 10$.
- **Subtask 5** (25 points) $N, M \leq 100$.
- **Subtask 6** (20 points) $P_i = G_i$ for all i.
- **Subtask 7** (20 points) No additional limitations.

Examples

`input.txt`	`output.txt`

`2 3`
`1 0 1`
`50 1 1`
`80 0 1`
	`0 0 0`

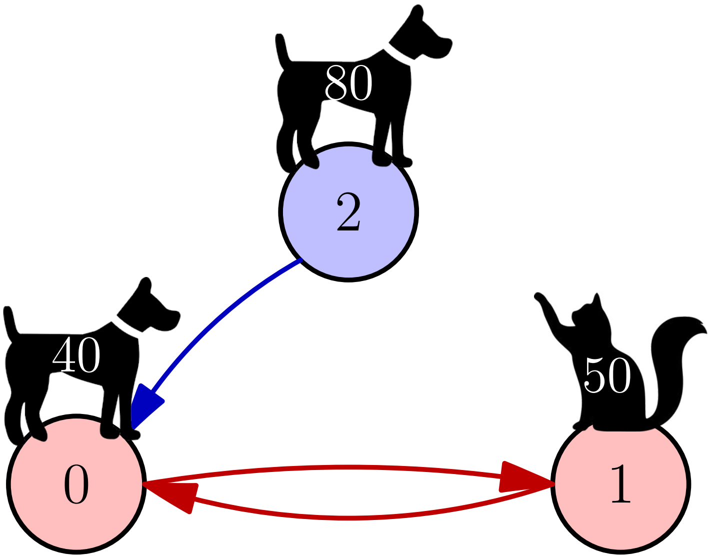
`3 3`
`0 1 2`
`40 0 1`
`50 1 1`
`80 0 0`
	`1 1 0`

`5 3`
`4 0 2`
`30 0 0`
`10 0 0`
`20 1 1`
`90 1 0`
`70 0 1`
	`1 0 1`

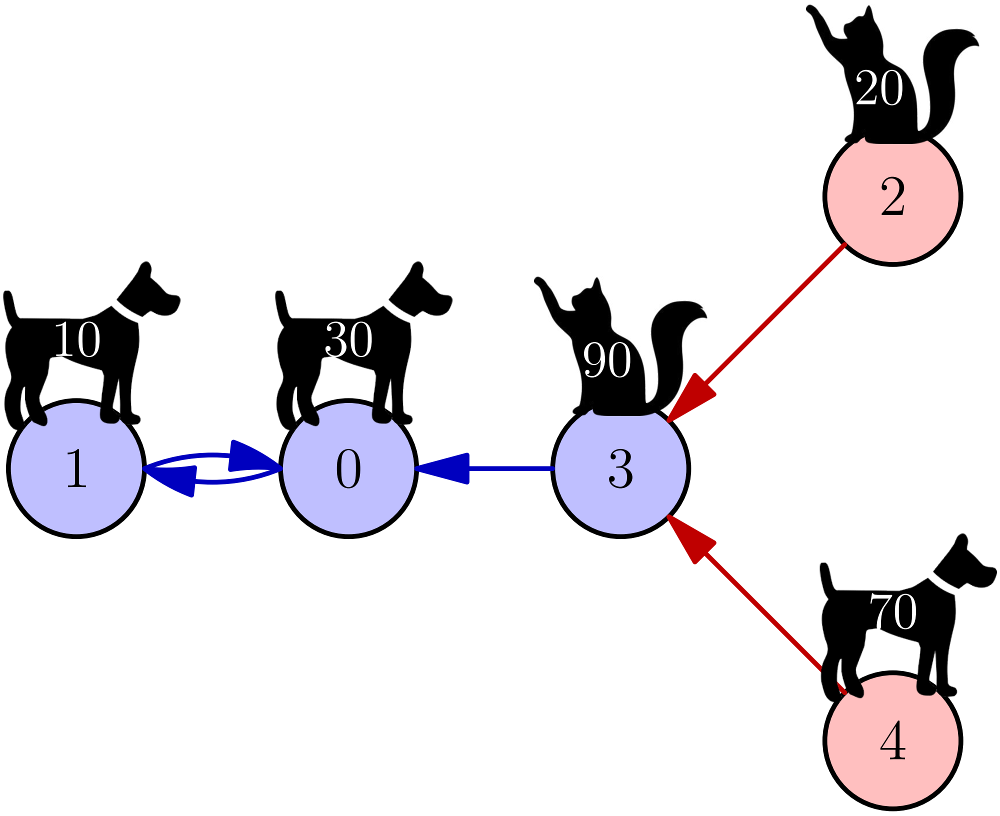
Explanation

In the **first sample case**, every exhibition is controlled by a cat lover. However, both exhibitions cannot do anything but directing groups to the other exhibition. Thus, every group will see every exhibition and leave with the memory of the best among them (which is exhibition 1 of dogs).

In the **second sample case**, an optimal strategy is represented by the arrows in the following picture, where blue exhibitions are controlled by dog-lovers and red exhibitions are controlled by cat-lovers, and awesomeness is written in white on top of the pet. According to this strategy, dogs are remembered only if starting from exhibition 2.



In the **third sample case**, an optimal strategy is the following: according to this strategy, dogs are remembered only if starting from exhibitions 0 or 1.


20
2
10
30
90
1
0
3
70
4