

Redeem Numerics



A positive integer **X** has been stolen. But luckily, **N** hints are available, each described by two integers **ai** and **di** , meaning that **|X-ai|=di**. The hints are numbered **1** through **N**. While some of those hints are helpful, some might be just a lie. Therefore, we are going to investigate the number **X** under different possible scenarios.

Initially, we neither trust nor distrust any hint. That is, each hint may be either true or false. Then, in each of the **Q** stages, we will either:

- 1 id

Entrust the **id**-th hint (**1<=id<=N**). That is, from now on, the **id**-th hint must be true, unless declared otherwise in the future.

- 2 id

Distrust the **id**-th hint (**1<=id<=N**). That is, from now on, the **id**-th hint must be false, unless declared otherwise in the future.

- 3 id

Neutralize the **id**-th hint (**1<=id<=N**). That is, from now on, the **id**-th hint may be either true or false, unless declared otherwise in the future. After each stage, you should determine the number of possible positive values **X** and report such values in an increasing order. If there are infinitely many such values, print **-1** instead.

Input Format

The first line contains two space-separated integers **N** and **Q**.

The **i**-th of the following **N** lines contains two space-separated integers **ai** and **di**, describing the **i**-th hint. It is guaranteed that no two hints are identical. That is, for every two different **i, j**, it is guaranteed that **ai!=aj** or **di!=dj**.

Then, **Q** lines follow, each containing two integers **t** and **id** — the type of an update and the index of an affected hint.

Constraints

$1 \leq N, Q \leq 200,000$ $0 \leq a_i, d_i \leq 10^9$ $1 \leq t \leq 3$ for every stage (update). $1 \leq id \leq N$ for every stage

Output Format

After each stage, print the number of possible values of **X** (in case there are infinitely many of them, print **-1**). If the number of possible values is finite and non-zero, in the same line, continue to print those values in an increasing order.

Sample Input 0

```
3 10
3 0
0 3
6 3
1 1
3 1
1 2
3 2
```

```
1 3
3 3
1 1
1 2
2 1
1 3
```

Sample Output 0

```
1 3
-1
1 3
-1
2 3 9
-1
1 3
1 3
0
0
```

Explanation 0

In the sample test, we are given **N=3** hints and **Q=10** stages. The first stage is described by a pair "1 1", which represents entrusting hint 1. After this stage, **|X-3|=0** must be true, so **X** must be equal to **3**. We report **1** possible value:**3**

Then, the information that **|X-3|=0** is neutralized at stage **2**. At this point, **X** could be any positive integer, so we print **-1** in the second line.