Problem C
Collecting Stars
Time limit: 2 seconds

You are planning to complete the latest Super Mario game as fast as you can. In this game, there are n stars that can be collected and your objective is to collect any k of them. Each star takes a certain amount of time to get. After collecting a star, Mario will reappear at the start of the game, so the time taken to collect any sequence of stars is the same regardless of the order that they are collected in. However, some stars do not become available for collection until a certain quantity of stars has already been collected.

Source: Pexels

Given a description of the stars, determine the fastest time in which you could collect k of them or determine that it is impossible to do so.

Input

The input starts with a line containing two integers n ($1 \leq n \leq 200\,000$), which is the number of stars, and k ($1 \leq k \leq n$), which is the number of stars you must collect.

The following n lines describe the stars. Each of these lines contains two integers t ($1 \leq t \leq 10^9$), which is the amount of time it will take to collect the star, and d ($0 \leq d < n$), which is the number of stars that must be collected before the star is available.

Output

Display the minimum amount of time to collect k stars. If you cannot collect k stars, display `IMPOSSIBLE`.

Sample Input 1

```
5 4
1 0
2 1
3 1
2 3
4 0
```

Sample Output 1

```
8
```

Sample Input 2

```
3 3
1 0
1 2
4 2
```

Sample Output 2

```
IMPOSSIBLE
```

Problem J
Jumping Junipers
Time limit: 4 seconds

Jack and Jill have a house in the woods. They have planted some juniper trees in a straight line that goes straight away from their house. Each tree is planted an integer distance from their house along this line. No two trees are at the same location.

Jack and Jill would like to move the trees closer to their home. Since the trees are heavy, they can only move the trees a certain distance in either direction (the distance for each tree can be different). The trees must end up at positive integer distances from their house along the line and no two trees may end up at the same place. Jack and Jill would like to minimize the sum of distances of the trees from their house. Show them how to do this.

Input

The first line contains a single integer n ($1 \le n \le 200\,000$), which is the number of trees.

The next n lines describe the trees. Each of these lines contains two integers d ($1 \le d \le 10^9$), which is the distance of this tree from their house, and t ($0 \le t \le 10^9$), which is the maximum distance that this tree can be moved in either direction.

Output

Display the new locations of the n trees (in the same order as given in input) that minimizes the sum of distances from Jack and Jill's house.

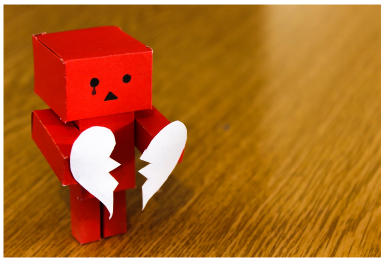
If there are multiple solutions, any one will be accepted.

Sample Input 1	Sample Output 1
3 12 3 11 1 100 1	9 10 99

Sample Input 2	Sample Output 2
2 10 2 12 4	8 9

Sample Input 3	Sample Output 3
2 343 117 100 15	226 85

Problem I
Island of Love
Time limit: 4 seconds



Island of Love is an exciting new game show. On this show, many of the contestants start as friends. The show is quite a high-pressure situation. It involves long bouts of relaxing by the pool, drinking lots of beer, gossiping, and strenuous arguing. Since it is such a stressful situation, people stop being friends as the season progresses. All friendships are bidirectional. That is, if person X is friends with person Y, then person Y is also friends with person X. Also, as the show goes on, people never become friends, they only ever stop being friends (yes, it is depressing).

Two people are on *speaking terms* if they are friends or if there is some sequence of friendships that connect the two people. For example, if person X is only friends with person Y and person Y is friends with person Z, then person X and person Z are on speaking terms. However, if person Y and person Z end their friendship, then person X and person Z are no longer on speaking terms since there is no sequence of friendships connecting them.

Your job is to process some friendship ending events, as well as determine if two people are on speaking terms at certain points throughout the season. All the events and queries will be in the order of the time that they occur. You can assume they all happen at distinct times. A friendship ending event results in two people no longer being friends.

Input

The first line of input contains three integers N ($1 \leq N \leq 10^5$), which is the number of people on the show, F ($0 \leq F \leq 10^5$), which is the number of distinct pairs of friends when the show begins, and Q ($0 \leq Q \leq 10^5$), which is the number of events and queries to process.

The next F lines describe the friendships. Each of these lines contains two integers X and Y ($1 \leq X < Y \leq N$), which denote that person X is friends with person Y. It is guaranteed that all pairs are distinct.

The next Q lines describe the friendship ending events and queries in the order they occurred. Each of these lines contains three items. The line starts with a single character t (t is either `E` or `S`). Then follow two integers X and Y ($1 \leq X < Y \leq N$). If t is `E`, then there was a friendship ending event between person X and person Y (it is guaranteed that they were friends before this event). If t is `S`, then you must determine if person X and Y are on speaking terms at this point in time.

Output

For each query in the given order, display if the two people are on speaking terms at that given time.

Sample Input 1	Sample Output 1
3 3 4 1 2 1 3 2 3 E 1 2 S 1 2 E 1 3 S 1 2	YES NO

Sample Input 2	Sample Output 2
4 4 5 1 2 1 3 2 3 3 4 E 1 2 S 1 4 E 2 3 S 1 4 S 2 4	YES YES NO

Odd Cycle Detection

Input
The first line of input will consist of two integers N and M: the number of nodes and number of edges built.
The following M lines of input will each contain two integers a and b, representing a edge built between points a and b. $1 \leq a, b \leq N$. This list is given in ascending order of time that the paths are built.

Output
Output should consist of M lines. The ith line should contain either Yes or No, answering whether when the ith edge is built, it is part of an odd cycle (an odd cycle can have repeated edges).

Sample Input
```
7 6
1 2
2 3
3 1
4 5
5 7
4 2
```

Sample Output
```
No
No
Yes
No
No
Yes
```