Bus Trip (trip)

In Italy there are N cities numbered from 0 to $N-1$. Luca lives in city S, but for the holidays he decided to go visit city E. Being just a student he doesn't want to spend a fortune in plane tickets, so he decided to have a nice **bus trip**!

Luca used a Bash script to download the complete schedules of all the bus companies in the country. He collected M bus routes, and for each of those he has collected the following four details:

1. the starting city;
2. the time of bus departure;
3. the arrival city;
4. the time of bus arrival.

Assuming that Luca is located in the city S at time $t = 0$, help him compute the earliest possible time he can reach the city E to enjoy his holiday, by using as many buses as needed.

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

Input

The first line contains the integer N. The second line contains two integers S and E. The third line contains the integer M. Each of the following M lines describe a bus route, and is formed by 4 integers, respectively: the starting city s, the starting time t_0, the arrival city e, the arrival time t_1.

Output

You need to write a single line with an integer: the earliest time when Luca can react E starting from S. If it's not possible to reach city E with the given schedules, write "IMPOSSIBLE" without quotes.

Constraints

- $1 \leq N \leq 50\,000$.
- $1 \leq M \leq 100\,000$.
- There is at most 1 bus route between two cities.
- For each bus route (s, t_0, e, t_1), it will hold: $0 \leq s, e < N$, $s \neq e$, and $0 \leq t_0 \leq t_1 \leq 10^9$.
- Luca can catch a bus that leaves at time t_0 if he arrives in its starting city at any time $t \leq t_0$.

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** (20 points) $N \leq 10$, $M \leq 30$.

– **Subtask 3** (30 points) There is one and only one possible path that connects any two cities.

– **Subtask 4** (30 points) $N \leq 1000$, $M \leq 3000$.

– **Subtask 5** (20 points) No additional limitations.

Examples

input	output
3 0 2 4 0 0 1 5 0 1 1 3 1 3 2 5 0 1 2 10	5
3 0 2 3 0 0 1 5 0 1 1 4 1 3 2 5	IMPOSSIBLE

Explanation

In the **first sample case**, Luca can catch the bus that leaves city 0 at $t = 1$, arrive at city 1 at $t = 3$, and then leave again at $t = 3$ towards city 2, arriving at $t = 5$.

In the **second sample case** Luca has no way to reach city E with buses only.