Problem E

Escape from Markov

Time Limit: 2.5 seconds

A crazed warlock has harnessed the power of the Koschei in order to resurrect a famous Russian mathematician as an undead lich. The mathematician, an expert in probability theory (specifically, stochastic processes), used his expertise in order to optimize the operations of the warlock's private military, allowing them to violently seize control of the country.

You are a member of a group of rebels whose sworn purpose is to overthrow the warlock-turned-warlord and restore freedom to the land. If you can destroy the phylactery which houses the lich's soul, then the mathematician will become mortal once more. Following the death of his grand logistician, you expect that the warlock's regime will crumble, and your country will be liberated once more. This is: Escape from Markov

There are n cities in the country, numbered 1 to n. These cities are connected by m bidirectional roads. Crossing any of these roads in either direction always takes exactly 1 hour. No road connects a city to itself, and any pair of cities is connected by at most one road. Travel between cities can *only* be done using these roads, and it is possible to reach any city from any other city using only these roads. You are currently located at city a. You need to reach city b as soon as possible, since you know that Markov's soul is stored somewhere there.

Unfortunately, the warlock has p patrol cars (formally known as the *Insurgent-Catching Police Cars*) which monitor the roads. Each patrol car has its own patrol plan, which graph theorists would describe as a closed circuit.

Each patrol car has a list of l cities that they visit, in order; when they are done visiting their lth city, they return to their starting city, and then start the patrol over. Currently, each patrol car is located at the first city in their list.

Any two consecutive cities in each plan (including the lth and first cities) are directly connected by a road. That is because patrol cars can also only travel between cities by taking the same roads you do. Note that a patrol car may visit the same cities or roads multiple times in its patrol plan. It also takes each of them exactly 1 hour to traverse each road in either direction.

While a patrol car is out of the city and on some road, that road becomes impossible to cross. If you try to cross a road while any patrol car is *anywhere* on that road (no matter what direction you or the car are headed) *besides* the city endpoints, you are caught, and the rebellion is crushed. However, you can also wait and hide indefinitely at any city for as long as you want without getting caught (even if a patrol passes through the city you are in at that time).

Given these conditions, find the shortest amount of time (in hours) that it will take you to get from city a to city b without getting caught, or report if this task is impossible.

Input Format

The first line of input contains four space-separated integers n, m, p, and l.

Then, m lines follow, each containing two space-separated integers u and v, meaning that a bidirectional road exists that connects cities u and v. No road connects a city to itself, and any pair of cities is connected by at most one road.

Then, p lines follow, each corresponding to the patrol plan of some patrol car. Each line will contain l space-separated integers. The first integer is the patrol car's starting city, and the remaining sequence describes the cities that the patrol car then visits, in order. Recall that after visiting the lth city in its plan, the patrol car returns to the first city and then starts its patrol over.

The last line of input contains two space-separated integers a and b.

Constraints

- $2 \leq n \leq 2 \cdot 10^5$
- $n - 1 \leq m \leq 2 \cdot 10^5$
- $1 \leq p \leq 2 \cdot 10^5$
- $2 \leq l \leq 2 \cdot 10^5$
- $p \cdot l \leq 10^6$
- You can visit any city from any other city by only using the roads.
- There exists a road connecting any two consecutive cities in a patrol plan
- $a \neq b$
- All cities in the input are between 1 and n inclusive

Output Format

Output a single integer, the shortest amount of time (in hours) it will take for you to go from city a to city b, or the word `IMPOSSIBLE` if the task is impossible.

Sample Input 1

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

Sample Output 1

```
2
```

Sample Input 2

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

Sample Output 2

```
2
```

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

Sample Input 4	Sample Output 4
2 1 1 2 1 2 2 1 1 2	IMPOSSIBLE

Explanation

For the first sample input, we start at city 1. Note that for the first hour, there is a patrol car headed from city 2 to city 1, so we can't head that way. We can avoid the patrol car by going from city 1 to 4, and then from city 4 to 3, taking a total of 2 hours.

For the second sample input, we would want to head to city 2 directly, but there is a patrol car monitoring the road between cities 1 and 2 for the first hour. So we wait for 1 hour at city 1. After the hour has passed and the patrol car has moved on, we proceed directly from city 1 to city 2. Overall, it took us a total of 2 hours.