Problem E: Colored Wizards

Advanced Algorithms for Programming Contests

Restrictions

Time: 2 seconds
Memory: 256 Mb

Problem description

The magical country Dreamland consists entirely of cities, some of which are connected by both-way roads. Moreover, every city is reachable from every other one (directly or through other cities), while no road connects a city with itself and there is at most one road between two cities.

Among the countless magical creatures living in Dreamland there are two colored wizards, a yellow one and a blue one. Whenever either of them travels through the country, the path it takes gets dyed in its respective color. It's well known that if the yellow and blue paths they leave behind overlap, this results in the common path becoming green, which is the color most detested by both wizards.

In a couple of days, for the first time ever, a conference of all the country's wizards will be held in its capital (one of the cities it consists of). Since they will have to start their respective journeys very soon in order to make it to the conference in time, the colored wizards want to know at least how many roads will have to be green when both of them have arrived in the capital. As the traces they left with their previous journeys have faded away over time, currently all roads in the country are without any color.

Unfortunately, the colored wizards are not so sure about which cities they are currently in, therefore the problem needs to be solved for a number of different cases representing their guesses about where they could be.

Input

The first line contains integers N and M ($1 \leq N \leq 10^5$, $1 \leq M \leq 5 \cdot 10^5$) – the numbers of cities and roads in Dreamland. In the second line, a single integer c is given – the index of the country's capital ($1 \leq c \leq N$). The next M lines together give a full description of Dreamland's road system: Each of them contains two integers a_i and b_i, denoting a road between cities a_i and b_i ($1 \leq a_i, b_i \leq N$).

After that there is a line containing only one integer K ($1 \leq K \leq 10^5$) – the number of joint guesses the two wizards have about their positions.

Finally there are K lines each containing one of the guesses, i.e. two integers in the range $1, ..., N$, representing the indices of the cities the wizards guess to be in.

Output

For each guess, output the minimum number of roads that would need to be left behind green by the wizards' journeys to the capital in case the guess was right.

Sample input and output

Input	**Output**
6 6 1 1 2 2 3 3 4 4 2 4 5 3 6 2 5 6 6 6	1 2