University of Dhaka
Department of Computer Science and Engineering
CSE 2212: Design and Analysis of Algorithms – I
Evaluation Lab 1

A. Rainy day in Sylhet

Sylhet is one of the most beautiful cities in Bangladesh during the monsoon season and Anik has decided to explore Sylhet in the monsoon season. But it is difficult for him to see as he navigates Sylhet in his car on a cloudy day. He has K units of petrol left in his car, and he can go one unit farther with each unit of fuel.

Given Sylhet's layout, which is made up of several interconnected cities, and his current location, your goal is to calculate and print the maximum number of cities he can visit until he runs out of fuel.

Input

- The input starts with four integers:
  - C: The number of cities in Sylhet.
  - R: The number of roads connecting different cities in Sylhet
  - K: The remaining fuel units in Anik's car.
  - L : Anik's current city
- The following R lines describe the road connections between cities as pairs of integers u,v, indicating a bidirectional road between cities u and v

Output

Output a single integer representing the total possible number of cities Anik can reach if he uses up all K units of his fuel.

Constraints:

$2 \le C \le 10^3$

$0 \le R \le (C*(C-1))/2$

$1 \le K \le 10^6$

$1 \le L \le C$

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

Explanation:

1. Anik starts in city 1 with 2 units of fuel.
2. He can move to city 5 using 1 unit of fuel (remaining fuel = 1).
    - From city 5, he can reach city 3 using 1 unit of fuel (remaining fuel = 0).
3. Alternatively, from city 5, he can reach city 2 using 1 unit of fuel (remaining fuel = 0).

At this point, Anik has 0 units of fuel and has reached cities 3 and 2. There are no further cities he can reach with his remaining fuel.

The total number of cities he can reach is {1, 5, 3, 2} through all possible paths.

So, the answer for the sample input, considering all possible paths, is 4.

BFS Approach:

- Initialize a queue to store cities to be visited.
- Initialize a set to keep track of visited cities.
- Add Anik's current city to the queue and mark it as visited.
- Initialize a variable reachableCities to 1, as Anik starts in one city.
- While the queue is not empty and Anik has remaining fuel:
- Dequeue a city from the queue.
- For each neighboring city that has not been visited and is reachable within the remaining fuel, enqueue it, mark it as visited, and increment reachableCities.
- The value of reachableCities represents the total number of cities Anik can reach.

As most of you solved this one, not sharing the code for this one