Connectivity

Lea is somewhat addicted to the newest web series "Guardians of the Enigma". Therefore it is important for her to always be connected to the internet to access the next episode as soon as it is released. However, recently, it has often happened that as soon as she wanted to watch it, some problem arised: the battery in her tablet was empty, the Wi-Fi router kept losing the connection, or her desktop did not not boot any more due to the newest system upgrade.

To avoid this problem, she has bought more devices and added even more connections between them. For example, she can use her smartphone, tablet, or laptop for watching, all of which are connected through her Wi-Fi router to the internet. Additionally, she can use her desktop computer connected by a cable to her local server, which then also has direct access to the internet. In this scenario, even if one her devices fails (the smartphone, laptop, router, desktop, or server), she can still access the internet. However, if the router and either the desktop or server breaks, the connection is lost by a failure of just two devices.

Now Lea needs to know how reliable her setup is. For that, she wants to know exactly how many devices have to fail for her to lose her connection to the internet. Fortunately, the connections themselves, e.g. the cables, will never fail, and also the internet endpoint is always working. Given the devices and their connections, as well as the devices Lea can use and the devices connected to the internet, can you tell Lea this number?

Input

The first line of the input contains an integer t. t test cases follow, each of them separated by a blank line.

Each test case consists of a line containing two integers n, the number of connection points, and m, the number of connections. m lines follow. The j-th line contains two integers a_j b_j, meaning that connection point a_j and b_j are connected. All connections are usable in both directions. The connection points are indexed from 1 to n, where number 1 is Lea, number n is the internet endpoint, and all numbers strictly between 1 and n are intermediate devices. The devices connected to 1 are the devices Lea has access to, and the devices connected to n are the devices with direct access to the internet endpoint.

Output

For each test case, print a line "Case #i: x", with i being the number of the test case, starting at 1, and x being the minimum amount of intermediate devices (excluding Lea and the internet endpoint) that have to fail for Lea to have no connection to the internet any more.

Constraints

- $1 \leq t \leq 20$
- $3 \leq n \leq 400$
- $2 \leq m \leq 100000$
- $1 \leq a_j, b_j \leq n$ for all $1 \leq j \leq m$
- $a_j \neq b_j$ for all $1 \leq j \leq m$
- There will always be at least one possible path from 1 to n.
- There will never be a direct connection from 1 to n.

Sample Input 1	Sample Output 1
5 4 4 1 2 1 3 2 4 3 4 4 4 1 2 2 3 2 4 3 4 5 6 1 2 1 3 1 4 2 5 3 5 4 5 6 8 1 2 1 3 1 4 2 3 3 6 4 5 4 6 5 6 7 9 1 2 1 3 1 4 2 5 3 5 3 6 4 6 5 7 6 7	Case #1: 2 Case #2: 1 Case #3: 3 Case #4: 2 Case #5: 2

Sample Input 2	Sample Output 2
5 6 10 1 2 1 4 1 5 2 3 2 4 2 6 3 6 4 6 4 5 5 6 4 5 1 2 1 3 2 3 2 4 3 4 5 6 1 3 3 2 2 5 3 4 1 2 4 5 3 2 1 2 2 3 9 18 1 2 1 3 1 4 1 5 1 7 2 3 2 4 2 9 3 4 3 9 4 5 4 6 4 9 5 7 6 8 6 9 7 8 8 9	Case #1: 3 Case #2: 2 Case #3: 2 Case #4: 1 Case #5: 4