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# Escape from the Island

Input file:            **standard input**  
Output file:           **standard output**  
Time limit:            2 seconds  
Memory limit:         256 megabytes

Little Horse wakes up and finds himself located on a desert island. The only way to escape from the island is by rowing a boat.

There are  $n$  islands numbered from 1 to  $n$ . Little Horse starts from one of these islands, and he needs to reach the  $n$ -th island to be rescued. There are  $m$  waterways, each of which connects two islands. In each waterway, the water flows from one island to the other one. Little Horse will apply the following steps in order:

1. Row the boat. At this step, he can go through at most  $k$  (possibly zero) waterways, either downstream or upstream. Going through each waterway will take 1 time unit.
2. Take a rest. At this step, he will randomly choose a waterway downstream and drift through it. He cannot stay at the current island unless there is no such waterway to drift through. Whether he moves or not, taking a rest will take 1 time unit.
3. Go back to step 1.

Once Little Horse reaches the  $n$ -th island, he will stop immediately. Please tell Little Horse that if he starts from the  $i$ -th island, what's the minimum time units he will spend in the worst case.

## Input

The first line of the input contains an integer  $T$  ( $1 \leq T \leq 10$ ) — the number of test cases.

The first line of each test case contains three integers  $n, m, k$  ( $1 \leq n \leq 10^5$ ,  $0 \leq m \leq 10^5$ ,  $0 \leq k \leq 50$ ) — The number of islands and waterways, and the maximum number of waterways Little Horse can go through when he rows the boat. The sum of  $n$  and the sum of  $m$  will not exceed  $10^5$ .

Then in the next  $m$  lines, each line contains two integers  $u, v$  ( $1 \leq u, v \leq n$ ,  $u \neq v$ ), which means there's a waterway between island  $u$  and  $v$ , and the water flows from  $u$  to  $v$ . It's guaranteed that the  $m$  waterways are all distinct, but it's possible that there's a waterway from  $u$  to  $v$  and also a waterway from  $v$  to  $u$ .

## Output

The output of the  $x$ -th case begins with *Case #x*: in a single line.

Then in the next  $n$  lines, the  $i$ -th line contains an integer indicating the minimum time units in the worst case if Little Horse starts from the  $i$ -th island. If he cannot reach the  $n$ -th island in the worst case, output  $-1$ .

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## Example

| standard input | standard output |
|----------------|-----------------|
| 3              | Case #1:        |
| 3 3 1          | 1               |
| 1 2            | 1               |
| 2 3            | 0               |
| 1 3            | Case #2:        |
| 3 2 1          | -1              |
| 2 1            | 1               |
| 3 2            | 0               |
| 4 3 2          | Case #3:        |
| 2 1            | 5               |
| 3 2            | 2               |
| 4 3            | 1               |
|                | 0               |