Problem G

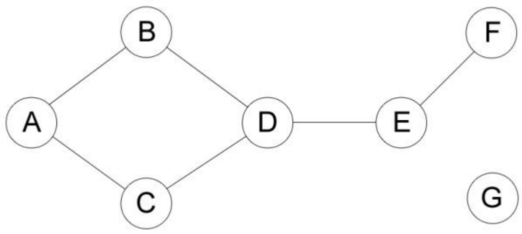
Unique Path

Given an undirected graph, your task is to determine the number of pair of nodes (A, B) which has exactly one path connecting them. Path connecting (A, B) is defined as sequence of nodes a_1, a_2, … a_K where:

- $a_1 = A$
- $a_K = B$
- $A \neq B$
- Any two adjacent nodes in the sequence have an edge connecting them
- There are no edges used more than once in the sequence.

As you might notice, the reverse path from A to B is a path from B to A, so in this problem we consider pair (A, B) is the same as pair (B, A).

For example, consider the following graph.



In the example above, only pair (E, F) has exactly one possible path while the other pairs have more than one or zero possible path. Here are some pairs that have more than one possible paths, note that this list is not exhaustive.

- (A, B) : A-B, A-C-D-B.
- (A, C) : A-C, A-B-D-C.
- (A, D) : A-B-D, A-C-D.
- (A, E) : A-B-D-E, A-C-D-E.
- (B, C) : B-A-C, B-D-C.
- (B, E) : B-D-E, B-A-C-D-E.
- (D, E) : D-E, D-B-A-C-D-E, D-C-A-B-D-E.
- …

Note that some paths visit one or more nodes more than once, e.g. pair (D, E): path D-B-A-C-D-E visits D twice, but the path does not use any edges more than once, so it is a valid path. Also notice that there is no possible path from/to G.

Input

The first line of input contains an integer T ($T \leq 30$) denoting the number of cases. The first line of each case contains two integers N ($2 \leq N \leq 10{,}000$) and M ($1 \leq M \leq 100{,}000$) denoting the number of nodes and edges respectively. The nodes are numbered from 1 to N. The next M lines each contains two integers a_i and b_i ($1 \leq a_i, b_i \leq N$; $a_i \neq b_i$) denoting that there is an edge connecting node a_i and b_i. Assume that there is at most one edge connecting a_i and b_i.

Output

For each case, output "`Case #X: Y`", where `X` is case number starts from 1 and `Y` is the number of pair of nodes (A, B) which has exactly one path connecting them.

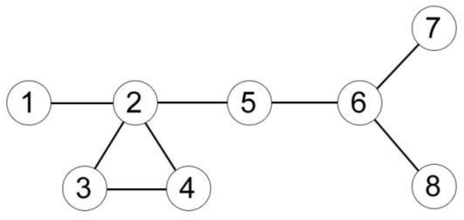
Sample Input	Output for Sample Input
4 7 6 1 2 1 3 2 4 3 4 4 5 5 6 5 4 1 2 2 3 2 4 4 5 4 4 1 2 2 3 3 4 4 1 8 8 1 2 2 3 2 4 2 5 3 4 5 6 6 7 6 8	Case #1: 1 Case #2: 10 Case #3: 0 Case #4: 6

Explanation for the 1st sample input.
This is the example from the problem statement.

Explanation for the 2nd sample input.
The graph is a tree, so any pair of nodes has a unique path.

Explanation for the 3rd sample input.
All the nodes lie in the cycle, so no pair of nodes has unique path.

Explanation for the 4th sample input.
The graph input corresponds to the figure below.



The pairs which have unique path are: (5, 6), (5, 7), (5, 8), (6, 7), (6, 8) and (7, 8).