# 2021 Canadian Computing Olympiad <br> Day 2, Problem 2 <br> Bread First Search 

## Time Limit: 1 second

## Problem Description

There are $N$ towns in a network of $M$ undirected roads. Each road connects one pair of towns. The government has decided to conduct a breadth first search, which means finding an ordering of the $N$ towns such that if the ordering begins with $r$ :

- Each town except for $r$ is adjacent to another town given earlier in the order.
- The towns are given in non-decreasing order of distance to $r$. Here, distance means the minimum number of roads that need to be traversed to reach a town.

However, someone mistakenly did a bread first search. They found the ordering $1,2, \ldots, N$ (this was obtained by sorting the towns in increasing order of bread production).

To cover up this embarrassment, the government would like to build new roads such that $1,2, \ldots, N$ is also a possible breadth first search ordering. The new roads can be built between any two towns. What is the minimum possible number of roads that need to be built?

## Input Specification

The first line contains the two integers $N$ and $M\left(1 \leq N \leq 200000,0 \leq M \leq \min \left(200000, \frac{N(N-1)}{2}\right)\right)$.
The $i$-th of the next $M$ lines contains the two integers $a_{i}$ and $b_{i}\left(1 \leq a_{i}, b_{i} \leq N\right)$, representing the two endpoints of the $i$-th road. It is guaranteed that $a_{i} \neq b_{i}$ and there is at most one road between any two towns.

For 5 of the 25 available marks, $N \leq 200$.
For an additional 6 of the 25 marks available, $N \leq 5000$.

## Output Specification

On a single line, output the minimum number of roads that must be constructed.

## Sample Input 1

20

## Output for Sample Input 1

## Explanation of Output for Sample Input 1

For 1,2 to be a breadth first search ordering, a road between towns 1 and 2 must be built.

## Sample Input 2

63
13
26
45

## Output for Sample Input 2

2

Explanation of Output for Sample Input 2
By building a road between 1 and 2 and a road between 1 and 4 , the sequence of distances becomes $0,1,1,1,2,2$ which is in non-decreasing order.

