Proudly powered by IMC

3: Redesigning Roeterseiland

Level: Medium
Time limit: 1 second

If you have ever been to Roeterseiland, you have likely been very confused when trying to navigate the building. There are a lot of possible ways to go from some room to another room, and it's easy to get lost along the way. To rectify the situation, the UvA has decided to renovate the entire building. The pathways between the rooms will get updated, so that there is always exactly one possible way to travel from some room A to some room B. This will hopefully avoid confusion, and make it a lot easier to memorize the layout of the building and the paths to all rooms.

To avoid having to totally redesign each room, the UvA keeps track of how many pathways start from a given room. If there are currently 5 ways to leave room A, and only 1 way to leave room A in the new navigation plan, it would require them to shut down the 4 other leading from that room. This is a costly operation, so the university would like to do this for as few rooms as possible. It should be noted that it is fine if an exit out of room A that was originally leading to room B now leads to room C.

Your task is to come up with a new floorplan for Roeterseiland, so that there is exactly one pathway from each room to each other room, while simultaneously minimizing the amount of rooms that must be renovated to adjust to the new amount of outgoing pathways. In Figures 1 and 2, the sample input can be seen alongside an optimal solution. In this solution, only room B has to change its amount of exits.

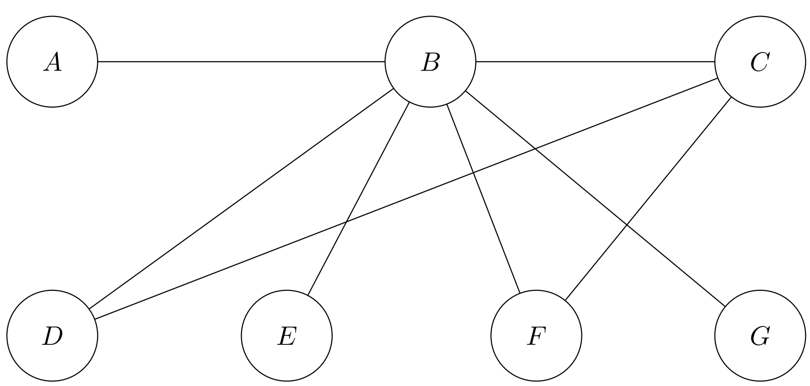

Figure 1: A visualisation of the sample input.

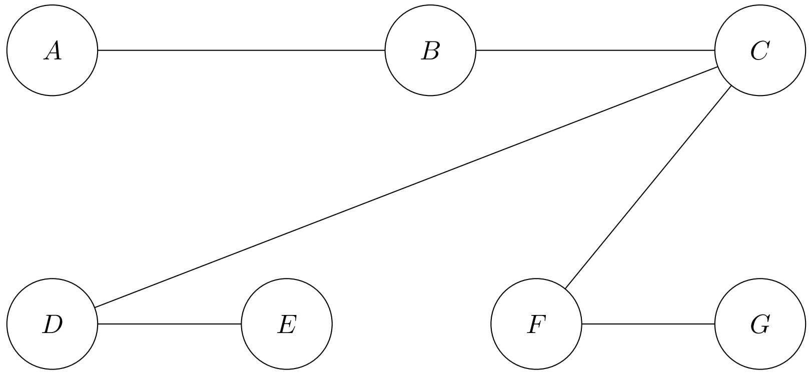

Figure 2: A visualisation for a possible solution to the sample input.

Input

The first line contains two integers, n ($2 \leq n \leq 10^4$) and m ($1 \leq m \leq 10^5$), which represent the amount of rooms (n), and the amount of connecting pathways (m) in the original floorplan. Rooms are numbered from 0 to $n-1$. Next are m lines, each with two integers i and j, indicating that there is a pathway between room i and room j (and vice versa, since pathways are undirected).

Output

First, output the smallest number of rooms for which the amount of outgoing pathways has to be changed. Then, output the new floorplan, in the same format as the input. Start with denoting the amount of rooms (this should not have changed), and the amount of connecting pathways. Then, for each pathway, output a line containing two integers i and j, indicating there is a pathway between room i and room j. If there are multiple optimal floorplans, any solution is accepted.

Sample input 1

```
7 8
0 1
1 2
1 3
1 4
1 5
1 6
0 5
0 3
```

Sample output 1

```
1
7 6
1 2
3 4
5 6
0 1
0 3
0 5
```