IOITC 2019
Team Selection Test 2

Equal Length Paths

An undirected graph is called a bipartite graph, if its vertex set V can be partitioned into two disjoint sets A and B (that is, every vertex is in exactly one of A or B), such that there are no edges between any two vertices in A, and no edges between any two vertices in B.

You are given a connected undirected graph, which is guaranteed to be bipartite. Its nodes are numbered from 1 to N. You need to orient each of the edges (that is, give a direction to every edge and make it one-way), so that for every vertex u other than vertex 1, there is at least one walk from u to 1, and every walk from u to 1 should have the same number of edges. Note that a walk can have repeating vertices and edges.

If there are multiple ways to do so, output any.

Input

- The first line contains two integers, N, M, which denote the number of vertices and number of edges in the graph respectively.

- The ith of the next M lines contains two integers, u_i and v_i, which denote that there is a bidirectional edge between vertices u_i and v_i.

Output

Output M lines, with the ith line containing the orientation of the ith edge in the input. That is, you should output either u_i v_i, denoting that you are orienting the edge to go from u_i to v_i, or v_i u_i denoting that you are orienting the edge to go from v_i to u_i.

Constraints

- $2 \leq N \leq 200000$

- $1 \leq M \leq 200000$

- $1 \leq u_i, v_i \leq N$

- There are no multi-edges or self loops in the input graph.

- The input graph will be connected.

Subtasks

- Subtask 1: 16%: The input graph is a complete bipartite graph. That is, the vertex set can be partitioned into some two sets A and B such that there are no edges between any two vertices in A, no edges between any two vertices in B, and there is an edge between every vertex in A and every vertex in B.

- Subtask 2: 18%: The input graph is a grid graph (which you can prove is bipartite). A grid graph is of this form:
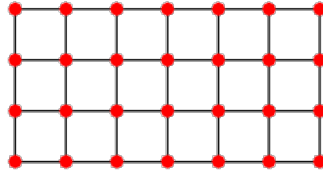
The nodes are numbered from 1 to N, from left to right, and top to bottom. So, the top left node is 1, the node to its right is 2, and the bottom right node is N.

- Subtask 3: 66%: The graph can be any connected bipartite graph.

Sample Input 1

```
4 4
1 2
2 4
3 1
3 4
```

Sample Output 1

```
2 1
4 2
3 1
4 3
```

Explanation 1

In the directed graph, after orienting the edges as given in the output, there is only 1 walk from the vertices 2 and 3 to 1. And from 4, there are two walks, both of which have length of two. Hence this is a valid output.

Sample Input 2

```
9 12
2 1
4 1
2 3
5 2
3 6
5 4
4 7
5 6
5 8
9 6
7 8
9 8
```

Sample Output 2

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

9 6
8 7
9 8