

Two's Company but Three's Trumpery

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 1024 megabytes

Let's review some knowledge of graph theory. In this problem, all the graphs discussed are undirected graphs.

- Connected graph: A graph is said to be connected if there exists a path between every pair of different nodes.
- Bridge: A bridge is an edge of a connected graph whose deletion makes the graph not connected.
- 2-edge-connected: A 2-edge-connected graph is a connected graph that does not have any bridges.
- 3-cycle: Nodes (u, v, w) are said to be a 3-cycle if (u, v) , (v, w) , and (u, w) are all directly connected by an edge.

Now given an undirected acyclic graph with n nodes and m edges (i.e., a forest), you need to add some edges to make the graph 2-edge-connected and have no 3-cycle. Please output the minimum number of edges to add and how to add them.

Input

The first line contains an integer T ($1 \leq T \leq 10^4$), indicating the number of test cases.

The first line of each test case contains two integers n and m ($1 \leq n \leq 10^5, 0 \leq m \leq n - 1$), indicating the number of nodes and edges in the graph.

Each of the following m lines contains two integers u and v ($1 \leq u, v \leq n$), indicating an undirected edge connecting u and v . It's guaranteed that there are no self-loops or multiple edges in the graph. It's also guaranteed that any two vertices in the graph are connected by at most one path.

It's guaranteed that the sum of n over all test cases won't exceed 10^5 .

Output

For each test case, output an integer k in the first line indicating the minimum number of edges to add. Then each of the following k lines contains two integers u and v ($1 \leq u, v \leq n$), indicating an undirected edge connecting u and v . You need to ensure that there are no self-loops or multiple edges in the graph after adding edges.

If there are multiple solutions with the minimum k , output any. If there are no possible solutions, output -1 in a single line.

Example

standard input	standard output
3	5
5 0	1 2
5 4	1 3
1 2	2 4
1 3	3 5
2 4	5 4
2 5	2
5 4	3 4
1 2	3 5
1 3	-1
1 4	
1 5	