CPC '21 Contest 1 P4 - AQT and Directed Graph

Time limit: 2.0s Python: 3.0s **Memory limit:** 256M Python: 512M

AQT is studying directed graphs and has encountered the following problem: given a directed graph consisting of N nodes with labels $1, 2, \ldots, N$ and M edges, find a pair of vertices (x, y) such that $x < y$ and y is reachable from x. Can you help him find such a pair in the graph (or output `-1` if none exists)?

Constraints

$2 \leq N \leq 3 \cdot 10^5$

$1 \leq M \leq 6 \cdot 10^5$

Subtask 1 [5%]

$2 \leq N \leq 5 \cdot 10^3$

$1 \leq M \leq 10^4$

Subtask 2 [10%]

If a directed edge connecting node a to b exists in the input, the edge connecting node b to node a is guaranteed to be in the input as well.

Subtask 3 [15%]

The graph will have no cycles.

Subtask 4 [70%]

No additional constraints.

Input Specification

The first line will contain the integers N, the number of vertices in the graph, and M, the number of edges in the graph.

The next M lines will each contain a directed edge in the form of 2 space-separated integers a, b, denoting an edge from node a to b. For all pairs (a, b), $a \neq b$.

Output Specification

Output a pair (x, y) such that $x < y$ and y is reachable from x. **If there exist multiple answers**, output the one that maximizes x, and then y if there are multiple answers with maximum x.

If no answer exists, output `-1` instead.

Sample Input 1

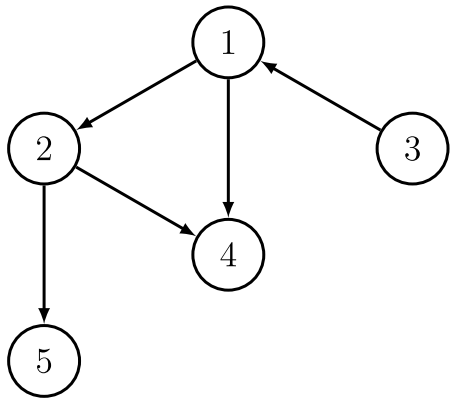
```
5 5
1 4
2 5
3 1
2 4
1 2
```

Sample Output 1

```
3 5
```

Explanation 1

Here is the graph given in the input:



The pairs of vertices (x, y) such that $x < y$ and y is reachable from x are:

- $(1, 2)$
- $(1, 4)$
- $(1, 5)$
- $(2, 4)$
- $(2, 5)$
- $(3, 4)$
- $(3, 5)$

The output is thus `3 5` as $(3, 5)$ maximizes x, then y.

This graph also satisfies subtask 3.

Sample Input 2

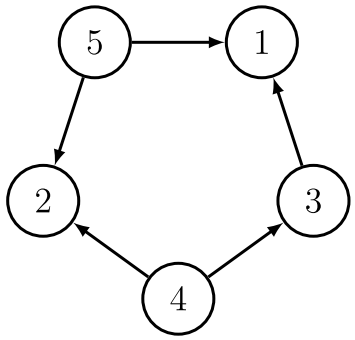
```
5 5
4 3
5 2
3 1
4 2
5 1
```

Sample Output 2

```
-1
```

Explanation 2

Here is the graph given in the input:



There are no pairs of vertices (x, y) such that $x < y$ and y is reachable from x, so the output is `-1`.

This graph also satisfies subtask 3.

Sample Input 3

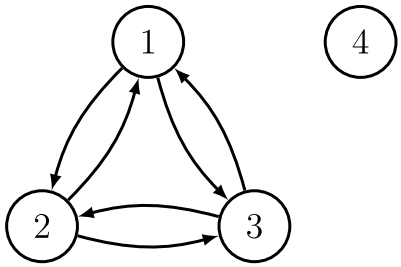
```
4 6
3 1
1 2
3 2
2 1
2 3
1 3
```

Sample Output 3

```
2 3
```

Explanation 3

Here is the graph given in the input:



This graph satisfies subtask 2.

Sample Input 4

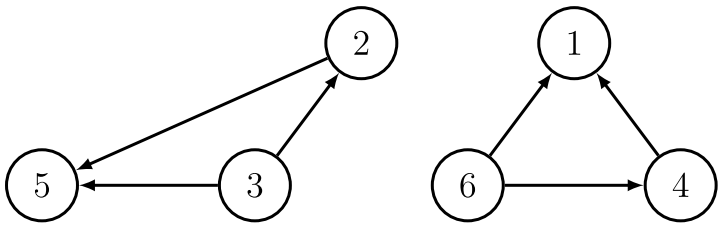
```
6 6
6 4
4 1
6 1
3 2
2 5
3 5
```

Sample Output 4

```
3 5
```

Explanation 4

Here is the graph given in the input:



This graph satisfies subtask 3.