Problem 9: Drop the Bass I [HackerRank]

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Every summer, smallmouth bass migrate across various lakes in the country Otalium, which are labelled from 1 to n. The bass start out in lake 1, and follow various rivers until eventually reaching lake n. Unfortunately, smallmouth bass are an invasive species, and can be quite damaging to the ecosystem. In an attempt to prevent this, inhabitants of Otalium have created a special electric net that, once inserted into a river, will prevent all bass from passing through. Unfortunately, the inhabitants only have enough netting to block passage through one river. Return all rivers where placing a net would prevent any smallmouth bass from reaching lake n.

Input

The first line contains two integers n and m, the number of lakes and the number of rivers. The next m lines contain two integers a and b, indicating a **directed** river (current only flows in one direction) between lakes a and b. Note that there could be a river where currents flow in both directions. It is also possible that there is no path along currents from 1 to n.

Output

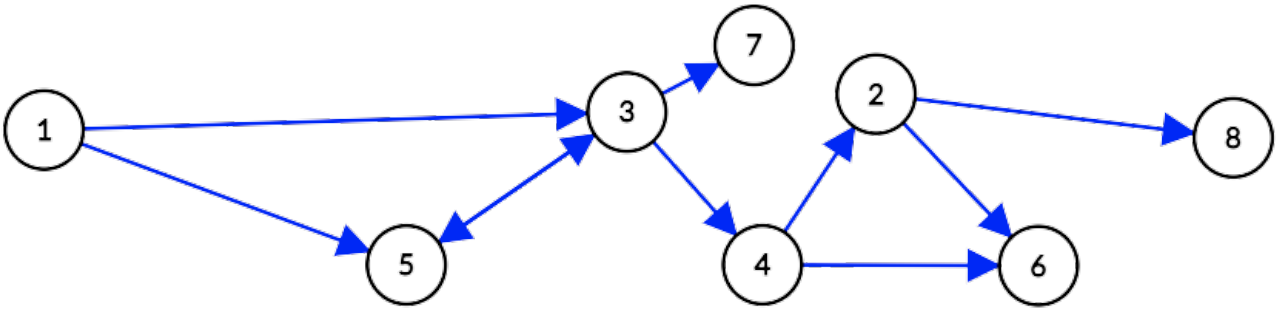
The first line should begin with a single integer t, representing the number of rivers that satisfy the condition. The next t lines should consist of two space separated integers c and d, indicating that netting within the river from c to d will prevent bass from passing through (the convention used here is that current in flows from c to d). Furthermore, these t lines must be sorted in ascending (lexicographical) order. That is, for two pairs $p_1 = (c_1, d_1)$ and $p_2 = (c_2, d_2)$ $p_1 < p_2$ if $c_1 < c_2$, or $c_1 = c_2$ and $d_1 < d_2$.

Constraints

You can assume that $1 \leq n \leq 3 \cdot 10^5$ and that $1 \leq m \leq 3 \cdot 10^5$.

See the next page for an example.

Example 0



Input:

```
8 10
1 5
5 3
3 5
1 3
3 4
4 6
4 2
2 8
2 6
3 7
```

Output:

```
3
2 8
3 4
4 2
```

Explanation: Severing any of the $2 \to 8$, $3 \to 4$, or $4 \to 2$ connections would prevent any smallmouth bass from starting in lake 1, swimming along currents, and ending up in lake 8. Conversely, severing any of the other connections would still leave a path along currents from lake 1 to lake 8.