F. Graph Theory

Bobo has an **undirected** graph G with n vertices labeled by $1, \ldots, n$ and n edges. For each $1 \le i \le n$, there is an edge between the vertex i and the vertex $(i \bmod n) + 1$. He also has a list of m pairs $(a_1, b_1), \ldots, (a_m, b_m)$.

Now, Bobo is going to choose an i and remove the edge between the vertex i and the vertex $(i \bmod n) + 1$. Let $\delta_i(u, v)$ be the number of edges on the shortest path between the u-th and the v-th vertex **after the removal**. Choose an i to minimize the maximum among $\delta_i(a_1, b_1), \ldots, \delta_i(a_m, b_m)$.

Formally, find the value of

$$\min_{1 \le i \le n} \left\{ \max_{1 \le j \le m} \delta_i(a_j, b_j) \right\}.$$

Input

The input consists of several test cases terminated by end-of-file. For each test case,

The first line contains two integers n and m.

For the following m lines, the i-th line contains two integers a_i and b_i.

- $2 \le n \le 2 \times 10^5$
- $1 \le m \le 2 \times 10^5$
- $1 \le a_i, b_i \le n$ for each $1 \le i \le m$
- In each input, the sum of n does not exeed 2×10^5. The sum of m does not exceed 2×10^5.

Output

For each test case, output an integer which denotes the minimum value.

Sample Input

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

Sample Output

```
1
0
2
```

Note

For the first case,

i	$\delta_i(1,2)$	$\delta_i(2,3)$
1	2	1
2	1	2
3	1	1

Choosing $i = 3$ yields the minimum value 1.