

IOI Training Camp 2018 Final Test 1

Circular Intervals

The integers 0 to $M - 1$ have been arranged in a circular fashion. That is, $0, 1, 2, \dots, M - 1$, are in that order and also, 0 and $M - 1$ are next to each other. The distance between any two adjacent numbers on this circle is 1 . You are given N intervals on this, such that no two intervals touch or intersect with each other. The i -th interval will be of the form $[L_i, R_i]$. This means that the i -th interval contains all the integers between L_i and R_i , both end points inclusive. You are supposed to mark exactly one number inside each interval, in such a way that the minimum distance between any two marked numbers is maximized.

More formally, we have $0 \leq L_1 \leq R_1 < L_2 \leq R_2 < L_3 \leq R_3 \leq \dots \leq L_N \leq R_N \leq M - 1$. You are supposed to mark exactly N numbers: A_1, A_2, \dots, A_N , such that $L_i \leq A_i \leq R_i$ for all $1 \leq i \leq N$. And you want to do it in such a manner $\min_{i \neq j}$ (shortest distance between A_i and A_j), is maximized.

Input

First line of the input contains a pair of integers M and N .

The i -th of the next N lines contains two numbers L_i and R_i which denote the end points of the i -th interval.

Output

A single integer denoting the answer.

General Constraints

Unless otherwise mentioned, the following constraints are met throughout all subtasks:

- $1 \leq M \leq 10^{18}$
- $2 \leq N \leq 10^6$

Subtasks

Subtask 1 (10 Points):

- $1 \leq M \leq 10000$
- $2 \leq N \leq 100$

Subtask 2 (25 Points):

- $1 \leq M \leq 10^{18}$
- $2 \leq N \leq 10^3$

Subtask 3 (65 Points):

- No further constraints.

Sample Input 1

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9 3
0 2
3 4
5 7
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Sample Output 1

3

Explanation

We can choose $A_1 = 0, A_2 = 3, A_3 = 6$. The distance between every adjacent marked pair of numbers is 3, and hence that is the minimum. You can check that you cannot do any better, and hence 3 is the answer.

Limits

Time: 4 seconds

Memory: 512 MB