Distant Pairs

by zemen

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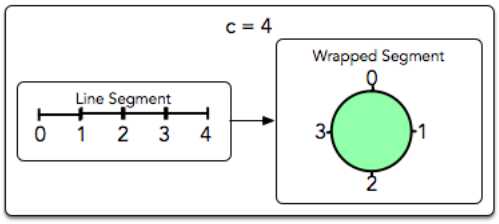
We take a line segment of length c on a one-dimensional plane and bend it to create a circle with circumference c that's indexed from 0 to $c-1$. For example, if $c=4$:

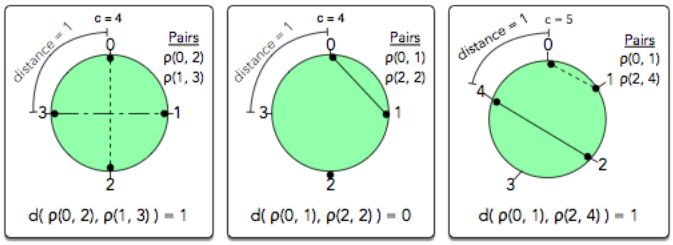


We denote a *pair* of points, a and b, as $\rho(a,b)$. We then plot n pairs of points (meaning a total of $2 \cdot n$ individual points) at various indices along the circle's circumference. We define the distance $d(a,b)$ between points a and b in pair $\rho(a,b)$ as $min(|a-b|, c-|a-b|)$.

Next, let's consider two pairs: $\rho(a_i,b_i)$ and $\rho(a_j,b_j)$. We define distance $d(\rho(a_i,b_i),\rho(a_j,b_j))$ as the *minimum* of the six distances between any two points among points a_i, b_i, a_j, and b_j. In other words:

$$d(\rho_i,\rho_j) = min(d(a_i,a_j), d(a_i,b_i), d(a_i,b_j), d(b_i,b_j), d(a_j,b_i), d(a_j,b_j))$$

For example, consider the following diagram in which the relationship between points in pairs at non-overlapping indices is shown by a connecting line:



Given n pairs of points and the value of c, find and print the *maximum* value of $d(\rho_i,\rho_j)$, where $i \neq j$, among all pairs of points.

Input Format

The first line contains two space-separated integers describing the respective values of n (the number of pairs of points) and c (the circumference of the circle).
Each line i of the n subsequent lines contains two space-separated integers describing the values of a_i and b_i (i.e., the locations of the points in pair i).

Constraints

- $1 \leq c \leq 10^6$
- $2 \leq n \leq 10^5$
- $0 \leq a,b < c$

Output Format

Print a single integer denoting the maximum $d(\rho_i,\rho_j)$, where $i \neq j$.

Sample Input 0

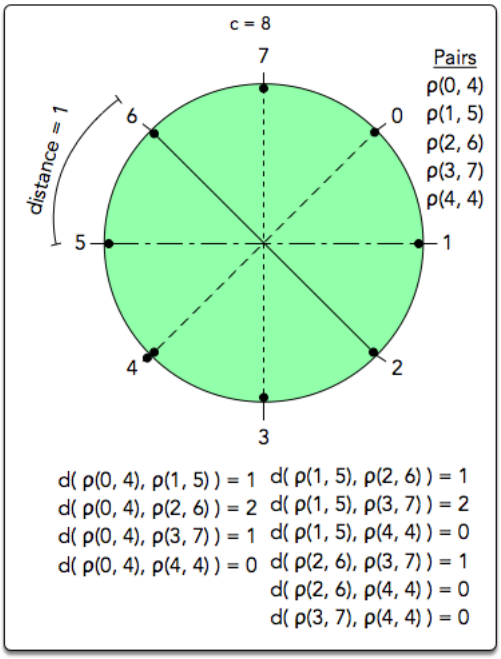
```
5 8
0 4
2 6
1 5
3 7
4 4
```

Sample Output 0

```
2
```

Explanation 0

In the diagram below, the relationship between points in pairs at non-overlapping indices is shown by a connecting line:



As you can see, the maximum distance between any two pairs of points is 2, so we print 2 as our answer.

Sample Input 1

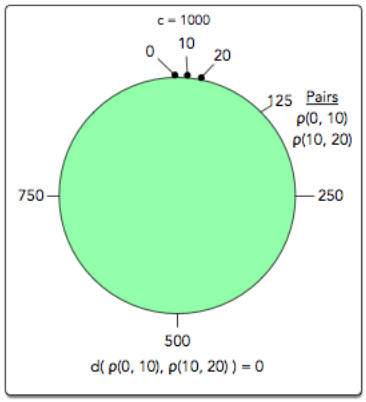
```
2 1000
0 10
10 20
```

Sample Output 1

```
0
```

Explanation 1

In the diagram below, we have four individual points located at three indices:



Because two of the points overlap, the minimum distance between the two pairs of points is 0. Thus, we print 0 as our answer.

Submissions:101

Max Score:80

Difficulty: Expert

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Java 7

```
1  import java.io.*;
2  import java.util.*;
3  import java.text.*;
4  import java.math.*;
5  import java.util.regex.*;
6
7  public class Solution {
8
9      public static void main(String[] args) {
10         Scanner in = new Scanner(System.in);
11         int n = in.nextInt();
12         int c = in.nextInt();
13         int[][] points = new int[n][2];
14         for(int points_i=0; points_i < n; points_i++){
15             for(int points_j=0; points_j < 2; points_j++){
16                 points[points_i][points_j] = in.nextInt();
17             }
18         }
19         // your code goes here
20     }
21 }
22
```

Line: 1 Col: 1

Upload Code as File Test against custom input Run Code Submit Code