

IOI Training Camp 2010 – Test 6, 23 June, 2010

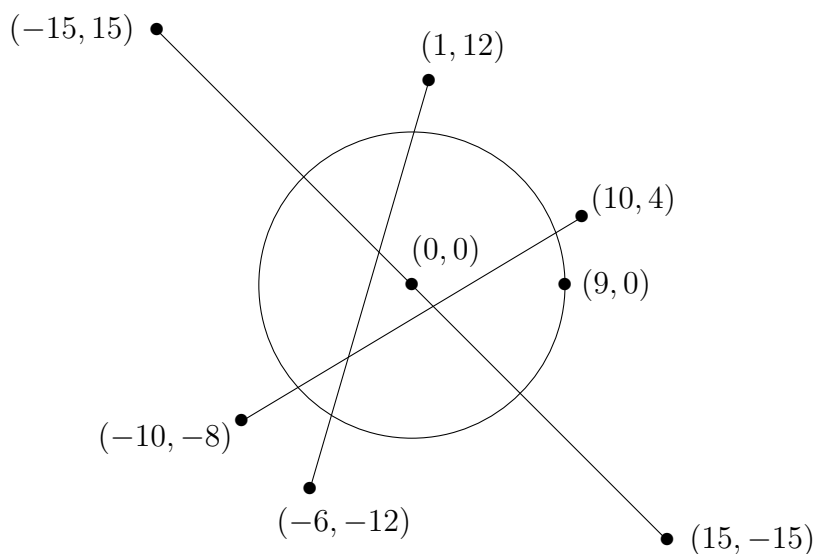
Problem 2 Birthday cake

It is your little sister's birthday and, as is tradition, she has the honour of cutting her circular cake. Being quite young, however, she is not yet very skilled at cake cutting. While each of her cuts slices completely through the cake, the slices do not necessarily divide the cake equally. To make things worse, she insists on cutting the cake again and again until she is sure the cake has been split into enough pieces.

As the final cut is being made, you look at the battle-scarred cake and wonder just how many pieces it has been split into. Deciding it is futile to count by hand, you take out your laptop and write a program to count the pieces for you.

The cake is circular and placed on an (x, y) coordinate system, with its centre at $(0, 0)$. Each cut is a line segment described by its two endpoints (x_1, y_1) and (x_2, y_2) , with all coordinates being integers. Both end points of a cut will lie outside the cake, but it is guaranteed that the line segment between these two points will cut through the interior of the cake. Note that several different cuts might run through the same point within the cake.

For example, consider a cake of radius 9, as shown in the diagram below. The first cut runs from $(-15, 15)$ to $(15, -15)$, the second cut runs from $(1, 12)$ to $(-6, -12)$, and the third cut runs from $(10, 4)$ to $(-10, -8)$. Together these cuts divide the cake into seven pieces, and so the answer is 7.



Given the cuts made by your little sister, your task is to determine how many pieces the cake has been divided into. For simplicity, you may assume that cuts have zero thickness and that no two cuts follow the same line.

Input format

The first line of input will contain the single integer R representing the radius of the circular cake. The second line of input will contain the single integer N representing the number of cuts your little sister has made. The next N lines will each describe one of the N cuts. Each line will contain integers x_1, y_1, x_2 and y_2 , separated by single spaces, corresponding to the endpoints (x_1, y_1) and (x_2, y_2) of one cut.

Output format

The output should consist of a single integer, the number of pieces that the cake has been cut into.

Test Data

You may assume that $1 \leq R \leq 1000$ and $1 \leq N \leq 1000$. For each endpoint (x_i, y_i) of a cut, $-20000 \leq x_i, y_i \leq 20000$.

Example

Here is the sample input and output corresponding to the example above.

Sample input

```
9
3
-15 15 15 -15
1 12 -6 -12
10 4 -10 -8
```

Sample output

```
7
```

Time and memory limits

The time limit for this task is 1 second. The memory limit is 44 MB (actual limit 32 MB, plus 12 MB buffer for 64-bit compilation).