



BITWISE 2011

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Garden Disaster (Points: 200)

Mr. Bean is taking a walk in a garden. The landscape artist of the garden was a great fan of abstract art and has put up an installation that reflects his taste. This is in the form of a circular patch of grass with a circular pavement running around its circumference. On this grass patch there are N straight lines of rose bushes each running from one point on the circumference to another. All around the pavement is a fence which has only one entry/exit point.

Mr. Bean is walking along this pavement and admiring the arrangement when all of a sudden a bee stings him on his eye. With his eyes watering and burning from the sting, Mr. Bean starts running around screaming. In his sorry state he cannot make out the bushes in the arrangement from the grass. All he can see is the pavement which is tiled with a relatively light colored material. He runs in such a manner that when he is on the patch of grass he is moving along a chord of the circle ruining any rose bushes that come in his way, and when he reaches the pavement he checks for the exit point in the fence. If he finds no exit, he moves along the pavement for some distance and takes another straight line path across the circle. He continues this until he finds the exit point in the fence. In the entire frenzied process, the number of chords Mr. Bean covers is M . The next morning the gardener comes to work only to find the installation ruined. Help him find out the number of points in the lines of rose bushes that he will have to repair.

The figure given below depicts the rose bush installation in the form of the pink lines on the green circle. The chord path of Mr. Bean is depicted with the blue lines. The brown cross is the entry/exit point in the fence.

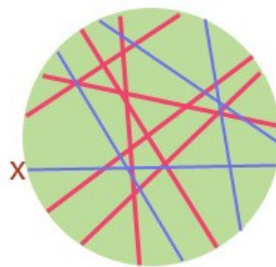


Figure 1: Bushes and Paths

Input Format:

The first line contains the number of test cases T .

For each test case, the first line of input will have an integer R which is the radius of the circular grass patch. The next line has the integer N which is the number of lines of rose bushes. Following this there are N lines each containing two integers P and Q separated by a space. The integers represent the end-points of the chords on the circumference of the circle. The first

point has polar coordinates (\mathbf{R}, θ_P) where θ_P is equal to $\mathbf{P}/\mathbf{MAX_VAL} \times 360$ degrees and the second point has polar coordinates (\mathbf{R}, θ_Q) where θ_Q is equal to $\mathbf{Q}/\mathbf{MAX_VAL} \times 360$ degrees. $\mathbf{MAX_VAL}$ is equal to 32767.

Following this the next line will contain the number of chords \mathbf{M} that Mr. Bean covers when he is running. The next \mathbf{M} lines will contain the endpoints of these chords on the circumference in the same format as the chords (rose bushes) as before.

Output Format:

For each test case, output \mathbf{M} integers each of a different line, where the integer on the \mathbf{i} -th line is the number of lines of rose bushes the \mathbf{i} -th chord covered by Mr. Bean intersects.

Sample Input:

```

2
5
3
7000 10000
14788 9678
3296 11250
5
6462 9915
9854 5944
222 10006
5433 2222
3454 2090
1
2
5455 9988
1125 11000
4
0 5000
9876 3342
9998 11211
87 89

```

Sample Output:

```

2
2
2
1
1
1

```

1
1
0

Instructions

- Your program should not print anything other than what is specified in the output format. A program with extraneous output (even a single space) will be treated as incorrect!
- While submitting your code, please select the language carefully *gcc/g++*. Using the wrong language will lead to compiler error.
- The only input/output functions allowed are `printf`, `scanf`, `cin`, `cout`. Perform all read/write operations through `stdin/stdout`. The solutions will be checked using command line redirection only.

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