

DMOPC '15 Contest 3 P4 - Contagion

Time limit: 1.0s **Memory limit:** 128M

cheesecake works part-time at the Centre for Disease Control and Prevention (CDC), where he researches the spread of diseases. An unknown pathogen has just broken out and **cheesecake** is determined to save the world!

The CDC's model of the world consists of N countries numbered 1 through N , represented by points on a 2-D coordinate plane. Country i is located at integral coordinates (x_i, y_i) .

Through extensive research, **cheesecake** has determined a vital piece of information: **the time in hours it takes for the pathogen to spread from one country to another is equal to the square of the distance between the two countries.** For example, if country A is located at $(0, 0)$ and country B is located at $(2, 3)$, it will take 13 hours for country B to be infected after the initial infection of country A . The source of the breakout, country X ($1 \leq X \leq N$), is infected at the 0-th hour.

In order to take preventative measures, **cheesecake** has been tasked with projecting the rate of infection. Specifically, he has to answer Q queries of the following form:

How many countries will be infected after Q_i hours?

Unfortunately, **cheesecake** isn't taking data management this semester, so he's at a total loss. Help him save the world!

Constraints

Subtask 1 [20%]

$$1 \leq N \leq 100, 0 \leq x_i, y_i \leq 100$$

$$1 \leq Q \leq 10, 0 \leq Q_i \leq 10^5$$

Subtask 2 [30%]

$$1 \leq N \leq 1000, 0 \leq x_i, y_i \leq 10^4$$

$$1 \leq Q \leq 1000, 0 \leq Q_i \leq 10^9$$

Subtask 3 [50%]

$$1 \leq N \leq 3000, 0 \leq x_i, y_i \leq 10^6$$

$$1 \leq Q \leq 10^6, 0 \leq Q_i \leq 10^{14}$$

Input Specification

The first line of input will contain N , the number of countries.

The next N lines will contain x_i and y_i , the coordinates of the i -th country, it is guaranteed that no two countries will have the same coordinates.

The next line will contain X , the source of the breakout.

The next line will contain Q , the number of queries.

The next Q lines will each contain a query.

Output Specification

For each query, output the answer on a new line.

Sample Input

```
4
2 2
0 3
5 1
4 0
1
4
8
10
4
7
```

Sample Output

```
3
4
1
2
```

Explanation for Sample Output

After 4 hours, the pathogen has not yet spread from its source, therefore the answer is 1. After 7 hours, country 2 is infected. After 8 hours, country 4 is also infected. At 10 hours, the pathogen has spread from country 4 to country 3.