DMOPC '15 Contest 3 P4 - Contagion

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%]

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

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

Note: For PyPy 2 and PyPy 3 and Haskell, the time limit is 10s and the memory limit is 256M.

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 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.