

## Problem L. Elastic BubbleWrap Odyssey

Input file: *standard input*  
Output file: *standard output*  
Time limit: 5 seconds  
Memory limit: 1024 mebibytes

In the quaint and magical Bubble Kingdom, there is an annual celebration called the Bubble Festival. The highlight of this festival is the traditional game of BubbleWrap. Here, master BubbleWrap craftsmen create elastic bands made of a mysterious and stretchable material sourced from the heart of the Bubble mountains.

For this year's competition, you have been tasked with a grand challenge: The Bubble Pillars. These pillars are situated on a 2D plane and have been crafted by Bubble Artisans, who imbued each with magical properties. The pillars are arranged in such a way that no three of them are collinear. You have a piece of the magical BubbleWrap elastic band that can stretch up to a maximum length of  $M$ .

Your mission, should you choose to accept it, is to wrap the BubbleWrap around as many pillars as possible to form an elastic enclosure. The more pillars you encapsulate inside the BubbleWrap or on its boundary, the more power you harness from them. *The elastic band must form a polygon without self-intersections.*

There are  $Q$  queries with different lengths  $M$ , and for each query, you have to figure out how many pillars you can encapsulate at most while abiding by the elasticity constraints of the BubbleWrap.

### Input

The first line of the input consists of a single integer  $N$ , the number of Bubble Pillars ( $1 \leq N \leq 100$ ).

Each of the next  $N$  lines contains two integers  $x_i$  and  $y_i$ : the coordinates of the  $i$ -th Bubble Pillar on the 2D plane ( $0 \leq x_i, y_i \leq 10^3$ ). No two pillars coincide (have the same  $x_i$  and  $y_i$  values). No three pillars are collinear (lie on the same line).

The next line consists of a single integer  $Q$ , the number of queries ( $1 \leq Q \leq 10^5$ ).

Each of the following  $Q$  lines consists of a real number  $M_i$  with at most 6 digits after the decimal point: the maximum stretchable length of the elastic band for that query ( $0 \leq M_i \leq 10^4$ ).

It is guaranteed that if some  $M_i$  would be smaller by  $10^{-6}$  or bigger by  $10^{-6}$ , the solution for the  $i$ -th query would not change.

### Output

For each query, output a single integer representing the maximum number of pillars you can encapsulate within the given stretchable length  $M_i$  of the BubbleWrap.

### Example

<i>standard input</i>	<i>standard output</i>
6	1
5 5	4
2 3	6
3 2	
1 5	
6 1	
1 1	
3	
1	
10	
21.1	

## Note

In the example above, we will label the points with numbers  $1, \dots, 6$  based on the input order.

For the first query, we can stretch the band around any one point, the length of the band is 0, and it encapsulates a single point.

For the second query, we can stretch the band around points  $[6, 3, 4]$ , to form a triangle that also contains point 2. The band has a length of approximately 9.84162.

For the third query, one possible solution is to wrap the band around points  $[6, 5, 2, 1, 3]$ . This arrangement encapsulates all 6 points with a total length of approximately 21.07769.