Projectile Motion

Consider a two-dimensional plane. There are **N** poles standing parallel to y-axis. The ith pole has height **Hi** and is between y = 0 and y = Hi and at position **Xi**. The gravity acts along negative y-axis and its value is **10**. **Q** projectiles are launched from origin with the jth projectile launched at an angle **Aj** and with speed **Sj**. For each projectile, print the index of pole that the projectile hits.

The poles in input are arranged in increasing order of **Xi**. If a projectile doesn't hit any pole, print -1. Indices of pole starts from 1. The angle is given in degrees and all other units follow SI.

Constraints

$1 <= N <= 10^5$

$1 <= Q <= 10^5$

$1 <= Xi <= 10^9$

$1 <= Sj <= 10^9$

$1 <= Aj <= 89$

$1 <= Hi <= 100$

Input

All values in input are integers.

The first line contains N.

The next N lines containes two space separated integers Xi and Hi. The Xis' are in increasing order and unique.

The next line contains Q.

The next Q line contains two space separated integers Aj and Sj.

Output

Print Q lines each containing the pole index hit by the jth projectile. If a projectile doesn't hit any pole, then print -1.

Example

Input:

```
4
1 1
2 3
3 7
6 3
8
10 34
45 20
50 12
60 14
70 65
60 34000000
85 12
81 14
```

Output:

```
1
1
2
3
-1
3
-1
4
```