Problem: RAI
Rainfall

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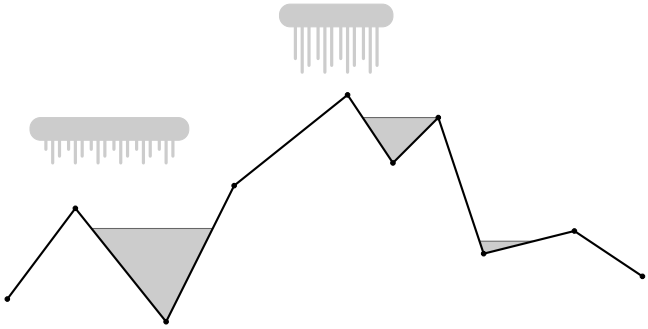
In the coming days, weather forecasters predict a heavy downpour in the Limonian Mountains. They expect a real cloudburst, therefore the Major Andrew Citrus convened a meeting of the crisis management team. The head of the team asked you to immediately write a program which will show based on forecasts which mountain valleys are facing threat of a flood.

The ridge of Limonian Mountains is described by a polyline specified by a sequence of n consecutive points $(x_1, y_1), (x_2, y_2), \ldots, (x_n, y_n)$. The first coordinate of each point means the distance between this point and the beginning of the ridge, and the second coordinate means the height above sea level. Additionally, $0 = x_1 < x_2 < \ldots < x_n$, coordinates y_i are pairwise different and also $y_1 < y_2$ and $y_{n-1} > y_n$. On the picture below one can see an exemplary mountain ridge after precipitation from two clouds.



Your program should support two types of events:

- adopting a meteorological forecast that in a given moment on an open interval (l, p) a cloud will appear, from which rain with a height of h units will fall;
- query concerning height of water column in a given moment on a given point q, on the assumption that all forecasts will prove to be true.

We assume that the rain flows in accordance with the laws of physics (note that the direction of the flow is uniquely determined due to distinctness of coordinates y_i) and does not seep into the ground. Moreover, there are no mountains to the left of the beginning of the ridge and to the right of its ending and the rain that reaches one of the ridge's boundaries will freely overflow outside the ridge.

Input

In the first line of the input file there are two integers n and m ($3 \leqslant n \leqslant 10^4$, $1 \leqslant m \leqslant 10^4$) specifying the number of points describing the mountain ridge and total number of forecasts and queries. In the next n lines the points are described: the i-th line contains two integers x_i and y_i ($-10^6 \leqslant x_i, y_i \leqslant 10^6$).

In the subsequent m lines there are descriptions of the events to serve: if in the i-th line a meteorological forecast is described, it begins from the letter `R`, and if in this line a query concerning height of water column is described, then this line begins with the letter `Q`. In the case of rain forecasts there are three integers l_i, p_i and h_i ($x_1 \leqslant l_i < p_i \leqslant x_n$, $1 \leqslant h_i \leqslant 10^6$) further in this line specifying the ends of interval where the cloud will appear as well as height of rain. In the case of queries there is one integer q_i ($x_1 \leqslant q_i \leqslant x_n$) further in this line specifying the place of performing a measurement of height of water column.

Output

If there are q queries in the input file, then the output file should have q lines: in the i-th line there should be a real number specifying the answer to the i-th query. The answer should be given with relative or absolute accuracy of at least 10^{-6}.

Scoring

Let s stand for the number of correct answers located in the output file. If $s < q/10$, then the score for the test is 0. Otherwise, the score for the test is s. This is a maximization task, therefore, the more correct answers, the better. The percentage of guaranteed points is 20%.

Example

For the input data:

```
10 7
0 0
3 4
7 -1
10 5
15 9
17 6
19 8
21 2
25 3
28 1
R 12 17 2
Q 17
Q 8
R 1 8 1
Q 8
Q 22
Q 1
```

the correct result is:

```
2.0000000000
1.0382181013
2.1137667560
0.3047001962
0.0000000000
```