

Mirko wanted to spin on a spinner today, but outside pretty bad rain started and he decided to stay in his house. Therefore, he invented new game which he intended to play whole day.

First, on one piece of paper he wrote N different positive integers between 1 and N . Now, he can choose any **interval of subsequent elements** and rotate it left or right. Example, if (5, 1, 8, 3) is the interval, then after **one left rotation** he gets (1, 8, 3, 5). Similar, with **one right rotation** he gets (3, 5, 1, 8). Beside rotating chosen intervals, Mirko can ask him self which number is on specific position.

So, there are three different operation on the array:

1. Interval from position A to B Mirko rotates K times to the left. Operation: $L\ a\ b\ k$
2. Interval from position A to B Mirko rotates K times to the right. Operation: $R\ a\ b\ k$
3. Mirko ask him self which number is at position X in current array. Operation: $P\ x$

For 1. and 2. operation constraints are $1 \leq a < b \leq N$, $1 \leq k < b - a + 1$.

For 3. operation constraint is $1 \leq x \leq N$.

Help Mirko and ask for him which number is at position X for every operation $P\ x$.

INPUT

The first line of input contains two positive integers N ($2 \leq N \leq 100\ 000$) and Q ($1 \leq Q \leq 100\ 000$), size of array na number of operations.

Second line of input contains N positive integers. This line represents array at the beginning of the game.

Next Q lines represent operations in described format.

OUTPUT

For every 3. command ($P\ x$) write single integer on a line which represents which number is at position x .

SCORING

Test data will be divided in **few separated parts** with following constraints:

- In data valued 10 points: $N, Q \leq 1000$. Additionally, **all** P x operations will come **after** all rotating operations.
- In data valued 10 points: $N \leq 100\,000, Q \leq 1000$. Additionally, **all** P x operations will come **after** all rotating operations.
- In data valued 50 points: $N \leq 100\,000, Q \leq 100\,000$. Additionally, **all** P x operations will come **after** all rotating operations.
- In data valued 30 points: $N \leq 100\,000, Q \leq 100\,000$

EXAMPLE TEST DATA

input 7 5 7 5 3 1 4 2 6 L 1 3 2 R 2 4 1 P 1 P 4 P 7	input 5 5 3 5 4 2 1 R 3 5 1 R 1 4 1 P 1 R 1 5 4 P 1
output 3 5 6	output 4 3

Luka had recently bought an expensive gold collar for his dog, and took him for a walk in the park. Entering the park Luka let the dog off the chain and went to the exit using **one of the fastest path**. His dog caught up with him exactly **T seconds** after Luka has reached the exit. However, Luka was very unhappy when he realized that his dog lost his collar. Now, he is interested in which park area his dog could lose the necklace.

Park can be represented as a two-dimensional plane, while Luka and a dog as points in it. At the moment when the dog is set loose, they were at the same coordinates (A_x, A_y) . Luka and the dog can move through the park only in 4 main directions (up, down, left and right) at speed of exactly 1 meter per second. They **can move independently** and are able to arbitrarily change the direction of movement during one second. For example, it is possible that one of them moves 0.37 meters up and then continues 0.63 meters to the right while other moves 1 meter to the left during one second.

Exactly **T** seconds after Luka came through one of the fastest way to the exit, the dog caught up with him and once again they were at the same coordinates (B_x, B_y) . Also in the park, there are rectangular fence enclosed gardens through which neither Luka nor the dog can move. These gardens are represented as rectangles in the plane that **do not touch or intersect each other**. Luka and the dog are able to move by the edges of the gardens.

Note: it is possible that the dog stood for a while in one place. Luka, before he reached the exit, was constantly moving at a speed of exactly 1 meter per second.

INPUT

First line of input contains integer N ($0 \leq N \leq 100$), which represents number of gardens inside the park.

Second line contains two integers A_x and A_y ($0 \leq A_x, A_y \leq 10000$), coordinates where Luka and the dog are entering the park.

Third line contains two integers B_x and B_y ($0 \leq B_x, B_y \leq 10000$), coordinates of exit of the park. These coordinates will always be different than coordinates of park entering (A_x, A_y) .

In next N lines there will be four integers $X1, Y1, X2, Y2$ ($0 \leq X1 < X2 \leq 10000, 0 \leq Y1 < Y2 \leq 10000$), where $(X1, Y1)$ defines lower-left, and $(X2, Y2)$ upper-right corner of garden. These rectangles will not contain or touch park entering or park exit

Last line of input contains integer T ($0 \leq T \leq 10000$), number of seconds Luka waited for his dog at the park exit.

OUTPUT

First and only line of output has to contain area of the park where the dog could have lost the necklace. U prvi i jedini red izlaza treba ispisati površinu na kojoj je Lukin pas mogao izgubiti ogrlicu.


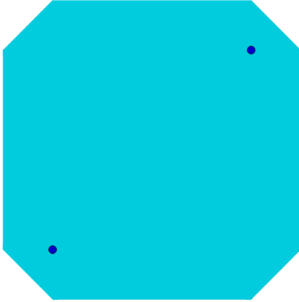
Solution will be accepted if absolute error is at most 0.01.

SCORING

Test data will be divided in **few separated parts** with following constraints:

- In data valued 60 points: $T = 0$; all coordinates ≤ 100 .
- In data valued 30 points: $T = 0$; all coordinates ≤ 10000 .
- In data valued 30 points: $T \leq 100$; all coordinates ≤ 100 .
- In data valued 30 points: $T \leq 10000$; all coordinates ≤ 10000 .

EXAMPLE TEST DATA

<p>input</p> <pre>2 1 1 5 5 2 2 3 6 4 3 7 4 0</pre> <p>output</p> <pre>7.000000</pre> <p>Explanation:</p> 	<p>input</p> <pre>0 1 1 5 5 2</pre> <p>output</p> <pre>34.000000</pre> <p>Explanation:</p> 
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