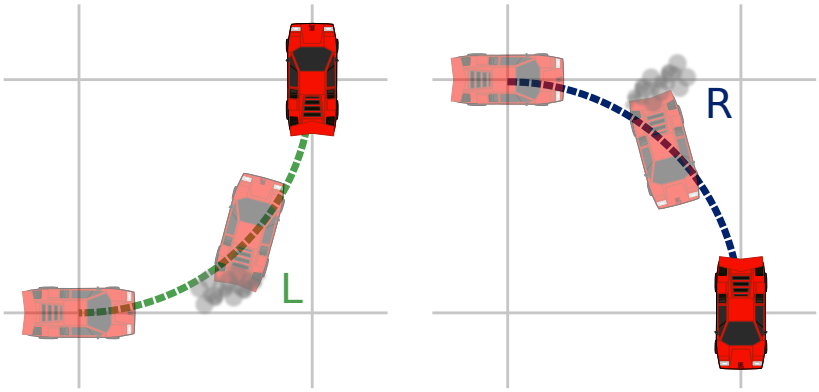
Problem C
The Drift King

There exists a cosmic being as old as the universe itself, one that they used to call *the Drift King* (back in college). The Drift King is simultaneously an entity of chaos and order. He drives his cosmic supercar[1] through space in a weird twisty-loopy-curvy manner that initially seems erratic... but in reality, the pattern is not so hard to understand!

Model the universe using the 2D Cartesian plane, and let the location of the Drift King's car be represented by a single point that is *oriented* so that it has a "front" facing a certain direction. The Drift King, naturally, only moves by drifting. His car can move in one of two ways, each represented by a certain symbol:

- `L` means: move counter-clockwise along a quarter-circular path that is centered around the point 1 unit to its left.
- `R` means: move clockwise along a quarter-circular path that is centered around the point 1 unit to its right.

Here is a picture of what those look like, if the Drift King's car is currently facing east.



These terms "left" and "right" are *relative* to where the car is currently facing. These quarter-circle turns will change the direction the car is facing at every step. The speed of the car is such that it completes one of these quarter-circle arcs in 1 unit of time.

The car's path is defined by a pattern formed by chaining these movements together, and then repeating that pattern infinitely (in both directions). We also know the location and orientation of the car at time $t = 0$, and thus its path is uniquely defined.

Formally, let s be a 0-indexed string $s = s_0 s_1 s_2 \ldots s_{n-1}$, where each character is `L` or `R`. This string s describes the pattern that extends infinitely in both directions. It performs these indicated turns in order, then loops back to the start when it reaches the end of the string (or vice versa).

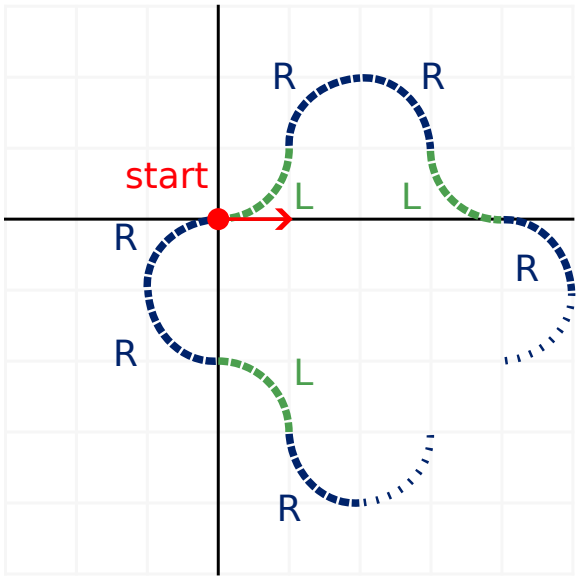
Precisely, the car's journey is defined to be the unique continuous path such that:

- at every integer time t (including the *negative* values), the car initiates a turn in the direction indicated by $s_{(t \bmod n)}$;
- at time $t = 0$, the car is at $(0, 0)$ and facing east.

We emphasize that even *in between* these integer timestamps, the car moves *continuously* through space as it performs these turns.

[1] a Lamborghini Countach LP1211-M

Here is what that path might look like, following the pattern `LRR`. Note how the car has already been moving in this pattern even before time $t = 0$.



Suppose that the Earth is located at the point (h, k). What is the closest (in terms of Euclidean distance) that this *menace* the Drift King will ever get (or has ever gotten) to our planet? Also, there will be T independent test cases per file.

Input Format

The first line of input contains a single integer T, the number of test cases. The descriptions of the T test cases follow.

The first line of each test case contains the two space-separated integers h and k.

The second line of each test case contains the string s.

Output Format

Output a single decimal value, the closest the Drift King ever gets (or has gotten) to Earth.

Your answer will be accepted if it has an absolute or relative error of at most 10^{-8} from the judge's answer. In symbols, let ans_{you} be your answer, and let ans_{judge} be the judge's answer. Your answer will be accepted if

$$\frac{|ans_{\text{you}} - ans_{\text{judge}}|}{\max(1, ans_{\text{judge}})} \leq 10^{-8}$$

Constraints

Constraints
$1 \leq T$ $-10^9 \leq h, k \leq 10^9$ $1 \leq \lvert s \rvert$ $\sum \lvert s \rvert \leq 10^5$ across all test cases Each character of s is `L` or `R`

Sample I/O

Input	Output
2 3 2 LRR 2 -1 LRR	0.41421356237309504876 1.82842712474619009753

Explanation

Both sample test cases use the pattern `LRR`, which is the example illustrated in the problem statement.