

Problem C. Robot

Input file: *standard input*
Output file: *standard output*
Time limit: 3 seconds
Memory limit: 512 mebibytes

There is an infinitely large 2-dimensional chessboard, in which every cell has a unique integer coordinate (x, y) . The starting cell has coordinate $(0, 0)$. If we start from this cell, walk x steps to the right, and then walk y steps upwards, we will arrive at cell (x, y) . Note that x and y could be negative, which means walking in the opposite direction.

There is a robot that starts from cell $(0, 0)$ and then executes a sequence of commands $c_1 c_2 \dots c_n$, where each $c_i \in \{L, R, D, U\}$, meaning walking one step in the direction of Left, Right, Down, Up, respectively. For example, if the sequence of commands is LRLD, then the cells traveled are $(0, 0) \rightarrow (-1, 0) \rightarrow (0, 0) \rightarrow (-1, 0) \rightarrow (-1, -1)$. We call such sequence the *travel history* of the robot (in this example, the history contains five elements).

For every cell (x, y) in the travel history, if it is the i -th time the robot visits this cell, then the robot earns a score of

$$f(x, y, i) = i \cdot ((|x| + 1) \text{ xor } (|y| + 1)) + i.$$

The total score is the sum of the score of every cell in the travel history. In this example, the total score is $f(0, 0, 1) + f(-1, 0, 1) + f(0, 0, 2) + f(-1, 0, 2) + f(-1, -1, 1) = 1 + 4 + 2 + 8 + 1 = 16$.

For every i from 1 to n , please answer: if we remove c_i from the sequence of commands, what is the total score earned by the robot after executing the remaining sequence $c_1 c_2 \dots c_{i-1} c_{i+1} \dots c_n$?

Input

The first line contains an integer n ($2 \leq n \leq 3 \cdot 10^5$).

The second line contains a string $c_1 c_2 \dots c_n$ of length n , denoting the sequence of commands.

Output

Output n lines. The i -th line must contain the total score if we remove command c_i .

Example

standard input	standard output
5	14
LRLDD	11
	14
	16
	16