Don't Fight The Music

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	1024 megabytes

There are N cards in a row. Each card has a red front side and a blue back side. An integer R_i is written on the red side of the i-th card, and an integer B_i is written on the blue side. Initially, every card is facing either red side up or blue side up.

An operation on a range $[l, r]$ is defined as follows:

- For each i from l to r, let c_i be the number of indices j with $l \leq j < i$ such that card j shows the same color as card i at the beginning of the current operation.
- After the operation, card i shows its red side if c_i is even, and its blue side if c_i is odd.
- All cards in $[l, r]$ are updated simultaneously.

You need to process the following Q queries:

- `1 i` — Flip the i-th card.
- `2 i k` — Change the value on the red side of the i-th card to k.
- `3 i k` — Change the value on the blue side of the i-th card to k.
- `4 l r T` — Calculate the sum of the numbers on the face-up sides in the range $[l, r]$, when the operation has been applied to this range T times. The state of the cards does not change as a result of this query.

Input

The first line contains a single integer N, the number of cards.

The second line contains a string s of length N, consisting of characters `R` and `B`. The i-th character of s denotes the initial side of the i-th card (`R` for red side up, `B` for blue side up).

The third line contains N integers $R_1, R_2, \cdots, R_N$ — the values on the red sides of the cards.

The fourth line contains N integers $B_1, B_2, \cdots, B_N$ — the values on the blue sides of the cards.

The fifth line contains a single integer Q, the number of queries.

Each of the next Q lines describes a query of one of the four types as described above.

Output

For each query of type 4, output a single integer, the calculated sum for the specified range.

Scoring

- $1 \leq N, Q \leq 2 \cdot 10^5$
- $1 \leq R_i, B_i \leq 10^9$
- For a query of type 1: $1 \leq i \leq N$
- For a query of type 2 or 3: $1 \leq i \leq N$, $1 \leq k \leq 10^9$
- For a query of type 4: $1 \leq l \leq r \leq N$, $1 \leq T \leq 10^9$

- It is guaranteed that there is at least one query of type 4.

Examples

standard input	standard output
5 RRRRR 1 2 3 2 1 5 4 3 4 5 4 4 1 5 1 4 1 5 2 1 2 4 1 4 1	13 11 8
8 RBRBRBRB 451 79 882 122 1289 242 2459 262 697 1082 1888 3070 225 410 751 1089 11 1 5 4 1 6 10121 1 3 2 6 803 3 3 741 4 2 7 11104 1 5 3 8 690 2 5 137 3 6 148 4 3 8 20915	7187 5810 6333