Purview

Input File	Output File	Time Limit	Memory Limit
standard input	standard output	1 second	256 MiB

There are N statues lined up along the shoreline of a sparesely inhabited Polynesian island. The local residents have endearingly named them from 1 to N, going from left to right.

Each year, the locals plant flowers in front of some of the statues. In front of each statue, the locals can plant any non-negative integer number of flowers (including 0).

Each statue is either facing to the left, or to the right. If the i-th statue is:

- Facing to the left, then it is able to see any flowers in front of statues $1, 2, \ldots, i-1, i$.
- Facing to the right, then it is able to see any flowers in front of statues $i, i+1, \ldots, N-1, N$.

Note that every statue is able to see the flowers in front of itself.

The locals have determined that the i-th statue must be able to see *at least* F_i flowers. What is the fewest flowers that need to be planted to satisfy these requirements?

Furthermore, in subtasks 3, 4, and 5, you must also handle D *demolitions*. The i-th demolition destroys statue X_i, meaning that:

- You cannot plant any flowers in front of this statue, and
- this statue *does not* need to see at least F_i flowers anymore.

All flowers on the island disappear after each demolition. After each demolition, what is the fewest flowers that now need to be planted to satisfy these requirements?

Subtasks and Constraints

For all subtasks, you are guaranteed that:

- $1 \leq N \leq 100\,000$.
- $0 \leq D \leq N$.
- $1 \leq F_i \leq 1\,000\,000\,000$, for all i.
- $1 \leq X_i \leq N$ for all i.
- Each statue is demolished at most once.

Additional constraints for each subtask are given below.

Subtask	Points	Additional constraints
1	18	$D = 0$ and $N \leq 1000$
2	18	$D = 0$
3	20	Only right facing statues are demolished
4	25	$D = N$ and $X_i = i$, for all i. That is, the statues are demolished from left to right.
5	19	No further constraints apply.

Input

- The first line of input contains the two integers, N and D.
- The second line contains a string of N characters. The i-th character (starting from 1) in the string is `L` if the i-th statue faces left, otherwise it is `R` (the statue faces right).
- The third line contains N integers. The i-th integer (starting from 1) is F_i.
- The fourth line contains D integers. The i-th integer (starting from 1) is X_i.

Output

The output should contain $D + 1$ lines.

- The first line should contain a single integer: the fewest flowers that need to be planted before any demolitions.
- D lines should follow. The i-th of these lines should contain the fewest flowers that need to be planted after the i-th demolition takes place.

Sample Input 1

```
4 0
RRLR
5 1 2 1
```

Sample Output 1

```
5
```

Sample Input 2

```
6 2
RRLLRL
2 3 6 1 2 3
5 3
```

Sample Output 2

```
8
6
4
```

Explanation

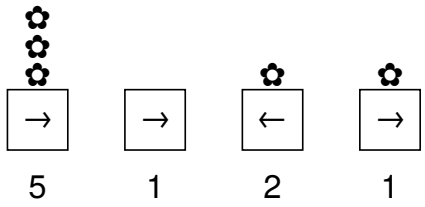

Figure 1: Sample Case 1

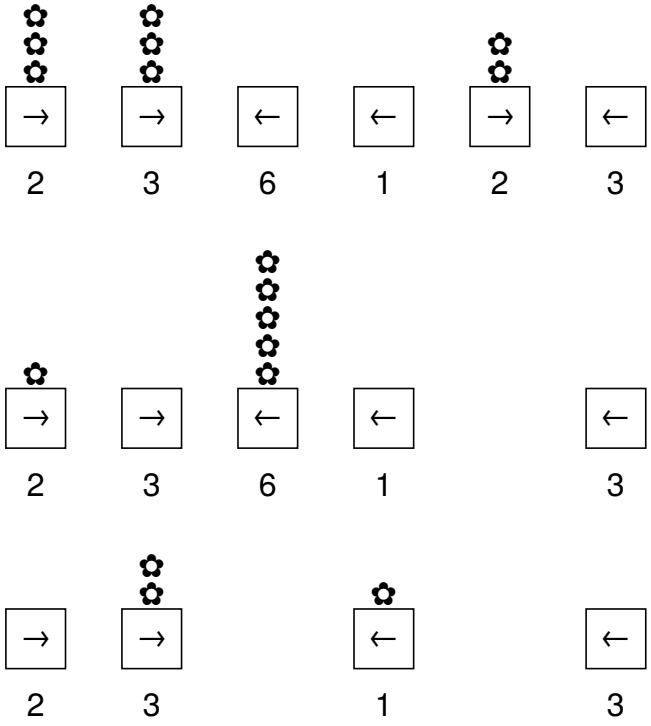

Figure 2: Sample Case 2