

# USA Computing Olympiad



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## USACO 2024 FEBRUARY CONTEST, BRONZE PROBLEM 2. MILK EXCHANGE

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English (en) ▾

Farmer John's  $N$  ( $1 \leq N \leq 2 \cdot 10^5$ ) cows are lined up in a circle such that for each  $i$  in  $1, 2, \dots, N - 1$ , the cow to the right of cow  $i$  is cow  $i + 1$ , and the cow to the right of cow  $N$  is cow 1. The  $i$ th cow has a bucket with integer capacity  $a_i$  ( $1 \leq a_i \leq 10^9$ ) liters. All buckets are initially full.

Every minute, the cows exchange milk according to a string  $s_1 s_2 \dots s_N$  consisting solely of the characters 'L' and 'R'. If the  $i$ th cow has at least 1 liter of milk, she will pass 1 liter of milk to the cow to her left if  $s_i = 'L'$ , or to the right if  $s_i = 'R'$ . All exchanges happen simultaneously (i.e., if a cow has a full bucket but gives away a liter of milk but also receives a liter, her milk is preserved). If a cow's total milk ever ends up exceeding  $a_i$ , then the excess milk will be lost.

FJ wants to know: after  $M$  minutes ( $1 \leq M \leq 10^9$ ), what is the total amount of milk left among all cows?

### INPUT FORMAT (input arrives from the terminal / stdin):

The first line contains  $N$  and  $M$ .

The second line contains a string  $s_1 s_2 \dots s_N$  consisting solely of the characters 'L' or 'R', denoting the direction each cow will pass their milk in.

The third line contains integers  $a_1, a_2, \dots, a_N$ , the capacities of each bucket.

### OUTPUT FORMAT (print output to the terminal / stdout):

Output an integer, the sum of milk among all cows after  $M$  minutes.

**Note that the large size of integers involved in this problem may require the use of 64-bit integer data types (e.g., a "long long" in C/C++).**

### SAMPLE INPUT:

```
3 1
RRL
1 1 1
```

### SAMPLE OUTPUT:

```
2
```

Cows 2 and 3 pass each other one liter of milk, so their milk is preserved. When cow 1 passes their milk to cow 2, cow 2's bucket overflows, and one liter of milk is lost after one minute.

### SAMPLE INPUT:

```
5 20
LLLLL
3 3 2 3 3
```

### SAMPLE OUTPUT:

```
14
```

Each cow is passing a liter of milk to the cow on the left and gaining a liter of milk from the cow on the right, so all of the milk is preserved regardless of how much time passes.

### SAMPLE INPUT:

```
9 5
RRRLRLLR
5 8 4 9 3 4 9 5 4
```

### SAMPLE OUTPUT:

38

Initially, there are a total of 51 liters of milk. After 5 minutes, cows 3, 6, and 7 will lose 5, 3, and 5 liters of milk respectively. Therefore, a total of 38 liters of milk remain.

**SCORING:**

- Inputs 4-8:  $N, M \leq 1000$
- Inputs 9-16: No additional constraints.

Problem credits: Chongtian Ma, Alex Liang

Contest has ended. No further submissions allowed.