Max-Min

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	512 megabytes

You are given a sequence $a_1, \ldots, a_n$ consisting of n integers. There will be a total of q operations performed on this sequence. Each of them involves increasing or decreasing a single element of the sequence by 1. After each operation, print the value of the following expression:

$$\sum_{i=1}^{n} \sum_{j=i}^{n} \left(\max_{i \le k \le j} (a_k) - \min_{i \le k \le j} (a_k) \right).$$

Input

The first line of input contains two integers n and q ($1 \le n, q \le 500\,000$), representing the length of the sequence and the number of operations, respectively. The second line contains n integers $a_1, \ldots, a_n$ ($|a_i| \le 100\,000$), indicating the initial values of the sequence elements. The next q lines describe the individual operations. Each of them is of one of the two types:

- the symbol `+` and an integer p ($1 \le p \le n$) – operation to increase the value of a_p by one,
- the symbol `-` and an integer p ($1 \le p \le n$) – operation to decrease the value of a_p by one.

Output

The output should contain q lines, and each of them should contain a single integer. The number in the i-th line should contain the sought value of the expression after performing the first i operations.

Example

standard input	standard output
3 6 0 0 -1 + 3 + 3 - 2 - 2 + 2 + 1	0 2 5 8 5 6

Note

The sequence after consecutive operations looks as follows:

- $0, 0, 0,$
- $0, 0, 1,$
- $0, -1, 1,$
- $0, -2, 1,$
- $0, -1, 1,$
- $1, -1, 1.$