

# Meetings

Dadas is organizing a research workshop in China. The  $N$  researchers are seated in a row, numbered from 0 to  $N - 1$  from left to right. They are comparing measurements of a newly discovered signal, and researcher  $i$  ( $0 \leq i < N$ ) currently reports the integer estimate  $A[i]$  of its strength.

During the workshop, new calibration data may arrive for a consecutive group of researchers.

In a meeting involving researchers  $L, L + 1, \dots, R$ , every adjacent pair  $(i, i + 1)$  with  $L \leq i < R$  meets exactly once, in any order. If two researchers currently have estimates  $x$  and  $y$ , then after they meet both estimates become  $\max(x, y)$ .

The **cost** of the meeting is the sum of the estimates of researchers  $L, L + 1, \dots, R$  after all pairwise meetings. Dadas chooses their order to minimize this cost.

Process the following  $Q$  queries in order:

1. New calibration data affects researchers  $L, L + 1, \dots, R$ , changing each of their estimates by  $V$ . That is, add  $V$  to  $A[i]$  for every  $i$  such that  $L \leq i \leq R$ .
2. Given  $L$  and  $R$ , find the minimum possible cost of a meeting involving researchers  $L, L + 1, \dots, R$ , using their current estimates.

A meeting in a query of type 2 is hypothetical: all estimate changes made during it are discarded after the query.

## Input

The first line contains two integers  $N$  and  $Q$ , the number of researchers and queries.

The second line contains  $N$  integers  $A[0], A[1], \dots, A[N - 1]$ , the initial estimates.

Each of the next  $Q$  lines has one of the following formats:

```
1 L R V
```

for a query of type 1, or

```
2 L R
```

for a query of type 2.

## Output

For each query of type 2, output one line containing its answer.

## Constraints

- All values in the input are integers.
- $1 \leq N \leq 500\,000$ .
- $1 \leq Q \leq 500\,000$ .
- $-10^9 \leq A[i] \leq 10^9$  for every  $i$  such that  $0 \leq i < N$ , initially.
- $0 \leq L \leq R < N$  for every query.
- $-10^9 \leq V \leq 10^9$  for every query of type 1.
- Every estimate is between  $-10^9$  and  $10^9$ , inclusive, initially and after each query of type 1.

## Subtasks

| Subtask | Score | Additional Constraints                                                                                                                                                                                |
|---------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | 6     | $N, Q \leq 8$                                                                                                                                                                                         |
| 2       | 10    | $N, Q \leq 5\,000$                                                                                                                                                                                    |
| 3       | 19    | There are no queries of type 1.                                                                                                                                                                       |
| 4       | 8     | Initially and after each query of type 1, $A[0] \leq A[1] \leq \dots \leq A[N-1]$ .                                                                                                                   |
| 5       | 9     | Initially and after each query of type 1, there is an integer $p$ ( $0 \leq p < N$ ) such that $A[0] \leq \dots \leq A[p]$ and $A[p] \geq \dots \geq A[N-1]$ . The value of $p$ may change over time. |
| 6       | 17    | In every query of type 2, $L = 0$ and $R = N - 1$ .                                                                                                                                                   |
| 7       | 31    | No additional constraints.                                                                                                                                                                            |

## Example

### Sample Input 1

```
6 5
7 2 3 1 4 8
2 0 5
2 1 4
1 1 3 5
2 0 5
2 1 4
```

### Sample Output 1

```
37
14
47
30
```

In the first query, all researchers participate. One possible order is (1, 2), (2, 3), (3, 4), (0, 1), (4, 5). It yields [7, 7, 3, 4, 8, 8], with the minimum cost 37.

The second query has cost 14. After the update, the array becomes [7, 7, 8, 6, 4, 8], so the last two answers are 47 and 30.

### Sample Input 2

```
5 3
452 87 734 19 628
1 0 3 37
2 0 0
2 1 4
```

### Sample Output 2

```
489
2941
```