Box Operations

HackerRank

Alice purchased an array of n wooden boxes that she indexed from 0 to $n-1$. On each box i, she writes an integer that we'll refer to as box_i.

Alice wants you to perform q *operations* on the array of boxes. Each operation is in one of the following forms:

(Note: For each type of operations, $l \le i \le r$)

- `1 l r c`: Add c to each box_i. Note that c can be negative.
- `2 l r d`: Replace each box_i with $\left\lfloor \frac{box_i}{d} \right\rfloor$.
- `3 l r`: Print the minimum value of any box_i.
- `4 l r`: Print the sum of all box_i.

Recall that $\lfloor x \rfloor$ is the maximum integer y such that $y \le x$ (e.g., $\lfloor -2.5 \rfloor = -3$ and $\lfloor -7 \rfloor = -7$).

Given n, the value of each box_i, and q operations, can you perform all the operations efficiently?

Input Format

The first line contains two space-separated integers denoting the respective values of n (the number of boxes) and q (the number of operations).
The second line contains n space-separated integers describing the respective values of $box_0, box_1, \ldots, box_{n-1}$ (i.e., the integers written on each box).
Each of the q subsequent lines describes an *operation* in one of the four formats defined above.

Constraints

- $1 \le n, q \le 10^5$
- $-10^9 \le box_i \le 10^9$
- $0 \le l \le r \le n-1$
- $-10^4 \le c \le 10^4$
- $2 \le d \le 10^9$

Output Format

For each operation of type 3 or type 4, print the answer on a new line.

Sample Input 0

```
10 10
-5 -4 -3 -2 -1 0 1 2 3 4
1 0 4 1
```

```
1 5 9 1
2 0 9 3
3 0 9
4 0 9
3 0 1
4 2 3
3 4 5
4 6 7
3 8 9
```

Sample Output 0

```
-2
-2
-2
-2
0
1
1
```

Explanation 0

Initially, the array of boxes looks like this:

-5	-4	-3	-2	-1	0	1	2	3	4

We perform the following sequence of operations on the array of boxes:

1. The first operation is `1 0 4 1`, so we add 1 to each box_i where $0 \leq i \leq 4$:

-4	-3	-2	-1	0	0	1	2	3	4

2. The second operation is `1 5 9 1`, so we add $c = 1$ to each box_i where $5 \leq i \leq 9$:

-4	-3	-2	-1	0	1	2	3	4	5

3. The third operation is `2 0 9 3`, so we divide each box_i where $0 \leq i \leq 9$ by $d = 3$ and take the floor:

-2	-1	-1	-1	0	0	0	1	1	1

4. The fourth operation is `3 0 9`, so we print the minimum value of box_i for $0 \leq i \leq 9$, which is the result of $min(-2, -1, -1, -1, 0, 0, 0, 1, 1, 1) = -2$.

5. The fifth operation is `4 0 9`, so we print the sum of box_i for $0 \leq i \leq 9$, which is the result of $-2 + -1 + -1 + -1 + 0 + 0 + 0 + 1 + 1 + 1 = -2$.

... and so on.