DMOPC '19 Contest 4 P6 - little_prince's Specialty Tea House

Time limit: 2.5s **Memory limit:** 256M

little_prince is opening a specialty tea house! One of his famous dishes is taiyaki, which is typically cooked in small fish-shaped molds. **little_prince** has N such molds lined up in a row. He knows that the batter inside the i-th taiyaki still needs to cook for t_i more seconds to be done. As running a specialty tea house is a lot of work, he wants you to help him answer Q queries, each of which is one of the following types:

- `1 x` which means to print the amount of time the i-th taiyaki still needs to be cooked.
- `2 x y t` which means that **little_prince** considers cooking the pans $x, x+1, \ldots, y$ for t seconds. If it would cause one of the taiyaki to overcook (overcooking means that $t > t_i$, where $x \leq i \leq y$), he ignores this instruction. Otherwise, he cooks each taiyaki in the range for t seconds.
- `3 x y t` which means that **little_prince** deems that the taiyaki in pans $x, x+1, \ldots, y$ are not up to standard. He pours new batter into the pans starting from left to right at a rate of one pan per second while the pans are heating. This means that the cook times of the pans becomes $t_i = t - y + i$ for $x \leq i \leq y$ as the earlier pans get cooked a little when **little_prince** is pouring in the batter for the later pans. It is guaranteed that $t - y + x \geq 0$.
- `4 x y` which means that **little_prince** reduces the cook times of each taiyaki in pans $x, x+1, \ldots, y$ to the floor of the square root of its original cook time. That is $t_i = \lfloor \sqrt{t_i} \rfloor$ for $x \leq i \leq y$.

Constraints

In all subtasks,
$1 \leq N \leq 100\,000$
$1 \leq Q \leq 500\,000$
$1 \leq x \leq y \leq N$
$1 \leq t_i, t \leq 10^{18}$

Subtask 1 [10%]

$1 \leq N, Q \leq 2\,000$

Subtask 2 [20%]

There are no type `3` or type `4` operations.

Subtask 3 [20%]

There are no type `3` operations.

Subtask 4 [50%]

No additional constraints.

Input Specification

The first line contains two integers, N and Q.
The second line contains N integers, $t_1, t_2, \ldots, t_N$, the initial cook times.
The next Q lines each contain a query, in the format as described above.

Output Specification

Output one integer on a separate line for each type `1` query.

Sample Input

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

Sample Output

```
1
3
0
```

Explanation for Sample Output

The first operation cannot be completed as it would cause the third taiyaki to overcook. Therefore, the array is `1 3 1 7 6`.
After the second operation, the array is `1 1 1 7 6`.
After the fourth operation, the array is `1 2 3 4 6`.
After the sixth operation, the array is `1 1 1 2 2`.
After the seventh operation, the array is `0 0 0 1 2`.