Problem I
Reactor

Time limit: 7 seconds

Problem Description

In a high-tech industrial facility, a series of nuclear reactors are arranged in a linear configuration. Each reactor operates under strict pressure regulations to ensure safety and efficiency. To prevent critical failures, each reactor has a specific maximum pressure limit. When a reactor's internal pressure reaches or exceeds this limit, a controlled pressure release (venting) is initiated. This system requires sophisticated management due to dynamic operational adjustments and the need for continuous monitoring.

You are tasked with designing and implementing a system to manage the pressure of a line of n reactors. Each reactor, indexed from 1 to n, has an initial maximum pressure limit p_i. All of the reactors' initial pressure are 0. The system must support two types of operations:

1. **Pressure Increase Operation:** For a given range of reactors $[l, r]$, increase their pressure by k units. If the pressure of any reactor in this range reaches or exceeds its maximum limit, it will vent, resetting its pressure to 0. And the maximum pressure limit of the vented reactor will be updated to $\max(\lfloor \frac{p_{old}}{2} \rfloor, 1)$, where p_{old} is the maximum pressure limit of the reactor before the current pressure increase operation.
2. **Venting Count Query:** For a given range of reactors $[l, r]$, you need to report the total number of venting operations that have occurred among all reactors within this specified range since the beginning of the system's operation.

Input Format

The first line contains two integers n and q, representing the number of reactors and the number of operations, respectively.

The second line contains n integers, the i-th integer p_i represents the initial maximum pressure limit of the i-th reactor.

The following q lines describe the operations. Each line begins with an integer op.

- If $op = 1$, it is followed by three integers l, r, and k, representing a pressure increase operation on the range of reactors from l to r (inclusive) by k units.
- If $op = 2$, it is followed by two integers l and r, representing a venting count query for the range of reactors from l to r (inclusive).

Output Format

For each query that $op = 2$, print a single integer on a new line, representing the total number of venting operations that have occurred among all reactors within the specified range since the beginning of the system's operation.

Technical Specification

- $1 \leq n \leq 2 \times 10^5$
- $1 \leq q \leq 2 \times 10^5$
- $1 \leq p_i \leq 4 \times 10^5$
- $1 \leq l \leq r \leq n$
- $1 \leq k \leq 4 \times 10^5$
- It is guaranteed that there is at least one Venting Count Query.

Sample Input 1

```
10 5
5 10 23 45 10 45 65 10 68 9
1 5 10 664
1 2 9 5
2 4 10
1 8 8 5
2 1 10
```

Sample Output 1

```
8
9
```

Sample Input 2

```
10 10
79 26 9 28 13 40 26 54 69 19
1 1 5 6
1 5 7 2
2 4 7
1 9 10 19
2 5 7
1 5 7 27
2 10 10
2 9 9
1 6 6 20
1 3 8 6
```

Sample Output 2

```
0
0
1
0
```

Sample Input 3

```
10 10
56 29 49 42 47 21 23 54 8 31
2 9 9
1 5 6 23
2 6 7
2 4 7
1 5 6 68
2 1 9
2 3 6
1 2 10 89
2 6 8
1 3 6 53
```

Sample Output 3

```
0
1
1
3
3
5
```

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