

Problem D. Array Queries

Input file: standard input
 Output file: standard output
 Time limit: 40 seconds
 Memory limit: 512 megabytes

We all love problems without a story, who doesn't?! Here's one more.

In this problem you are given an array of N integers a_1, a_2, \dots, a_N . Followed by Q queries, each query will be in one of the following types:

1. For each integer a_i where $L \leq i \leq R$, replace it with $\text{floor}(\text{sqrt}(a_i))$. Where $\text{sqrt}(a)$ is the square root of a , and $\text{floor}(b)$ is the integer value of b after removing everything on the right of the decimal point.
2. Print the sum of all integers a_i where $L \leq i \leq R$.
3. Add x to each integer a_i where $L \leq i \leq R$.

Input

Your program will be tested on one or more test cases. The first line of the input will be a single integer T ($1 \leq T \leq 100$) representing the number of test cases. Followed by T test cases.

Each test case starts with a line containing 2 integers separated by a space, N ($1 \leq N \leq 10^5$) representing the number of integers in the array and Q ($1 \leq Q \leq 20,000$) representing the number of queries.

Followed by a line containing N integers separated by a space, which are the initial integers in the array a_1, a_2, \dots, a_N ($1 \leq a_i \leq 10^6$).

Followed by Q lines, each line will be in one of the following formats ($1 \leq L \leq R \leq N$) and ($1 \leq x \leq 10^6$):

A query of the first type: 1 L R

A query of the second type: 2 L R

A query of the third type: 3 L R x

Output

For each query of the second type, print the corresponding answer in a single line.

Example

standard input	standard output
1	3101
10 7	14260
1 5 123 53 12 2901 12 1234 657 3419	9183
2 3 7	
3 5 8 1	
1 2 4	
3 1 6 1000	
2 1 10	
2 2 8	
1 3 5	

$N * Q = 2 * 10^9 = 2$ billion, sqrt for all elements - time limit
 But if we are only sum and print half of elements, we are wasting
 half of calculation