

# USA Computing Olympiad



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## USACO 2026 THIRD CONTEST, SILVER PROBLEM 2. MILK BUCKETS

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Time Remaining: 3 hrs, 26 min, 59 sec

Submitted; Results below show the outcome for each judge test case

*	*	*	*	*	*	*	*	*	*	*	*
3.5mb	3.5mb	3.5mb	3.5mb	3.5mb	3.5mb	3.5mb	3.5mb	3.5mb	3.5mb	3.5mb	42.9mb
1	2	3	4	5	6	7	8	9	10	11	12
2ms	2ms	2ms	2ms	2ms	15ms	15ms	15ms	15ms	15ms	15ms	686ms
*	*	*	*	*	*	*	*	*	*	*	*
42.9mb	42.9mb	42.9mb	42.9mb	42.9mb	42.9mb	42.9mb	42.9mb	42.9mb	42.9mb	42.9mb	42.9mb
13 696ms	14 688ms	15 682ms	16 691ms	17 706ms	18 703ms	19 700ms	20 696ms	21 690ms	22 689ms	23 720ms	

English (en) ▾

There are  $N$  ( $1 \leq N \leq 2 \cdot 10^5$ ) buckets in a stack where the  $i$ -th bucket from the top has capacity  $a_i$  gallons ( $1 \leq a_i \leq 10^9$ ). A tap above the top bucket sends one gallon of milk per second into the first bucket per second. There is also a pool below bucket  $N$ .

When a bucket reaches its capacity after  $t$  seconds, at the start of the  $t + 1$ th second it flips to dump its contents into either the bucket below if it is not the last bucket or the pool otherwise (it reverts back to filling at the end of the  $t + 1$ th second). A bucket cannot collect milk while it is flipped; any milk arriving at the bucket above during this second is lost. Additionally, any amount of milk exceeding the capacity of the bucket below is lost.

Handle  $Q$  ( $1 \leq Q \leq 3 \cdot 10^5$ ) queries, each specified by three integers  $i$ ,  $v$ , and  $t$ :

- First, set  $a_i = v$  ( $1 \leq i \leq N, 1 \leq v \leq 10^9$ ).
- Then answer the following question: Suppose that at time 0, all buckets as well as the pool are empty. Determine the number of gallons of milk in the pool after  $t$  seconds ( $1 \leq t \leq 10^{18}$ ).

The  $a_i = v$  updates persist through later queries.

**INPUT FORMAT (input arrives from the terminal / stdin):**

The first line contains  $N$ .

The second line contains  $a_1 \dots a_N$ .

The next line contains  $Q$ .

Then the following  $Q$  lines contain three integers  $i$ ,  $v$ , and  $t$ . This means that you should set  $a_i = v$  and then answer the question for  $t$ .

**OUTPUT FORMAT (print output to the terminal / stdout):**

Output the answer to each question on a separate line.

**SAMPLE INPUT:**

```
3
1 1 1
30
1 1 1
1 1 2
1 1 3
1 1 4
1 1 5
1 1 6
1 1 7
1 1 8
1 1 9
1 1 10
1 2 1
1 2 2
1 2 3
1 2 4
1 2 5
1 2 6
1 2 7
1 2 8
1 2 9
```

```

1 2 10
2 2 1
2 2 2
2 2 3
2 2 4
2 2 5
2 2 6
2 2 7
2 2 8
2 2 9
2 2 10

```

**SAMPLE OUTPUT:**

```

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

```

When  $a = [1, 1, 1]$ ,

- Bucket 1 flips at times 2, 4, 6, ...
- Bucket 2 flips at times 3, 5, 7, ...
- Bucket 3 flips at times 4, 6, 8, ...

When  $a = [2, 1, 1]$ ,

- Bucket 1 flips at times 3, 6, 9, ...
- Bucket 2 flips at times 4, 7, 10, ...
- Bucket 3 flips at times 5, 8, 11, ...

When  $a = [2, 2, 1]$ ,

- Bucket 1 flips at times 3, 6, 9, ...
- Bucket 2 flips at times 4, 7, 10, ...
- Bucket 3 flips at times 5, 8, 11, ...

**SAMPLE INPUT:**

```

2
1 2
10
1 1 1
1 1 2
1 1 3
1 1 4
1 1 5
1 1 6
1 1 7

1 1 8
1 1 9
1 1 10

```

**SAMPLE OUTPUT:**

0  
0  
0  
0  
2  
2  
2  
2  
4  
4

**SAMPLE INPUT:**

```
3
1 1 1
1
1 1 10000000000000000000
```

**SAMPLE OUTPUT:**

```
4999999999999999999
```

**SCORING:**

- Inputs 4-5:  $N \leq 10, Q \leq 100$ , and all  $t \leq 10^4$
- Inputs 6-11:  $N \leq 10^3, Q \leq 10^4$
- Inputs 12-23: No additional constraints.

Problem credits: Akshaj Arora

**Language:** **Source File:** 未选择任何文件**Previous Submissions:**

[Fri, Feb 20, 2026 09:06:52 EST \(C++17\)](#)

[Fri, Feb 20, 2026 09:08:00 EST \(C++17\)](#)