

# DMOPC '15 Contest 1 P6 - Lelei and Contest

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Lelei La Lalena has been studying competitive programming in our world. Today, she decides to do a contest on [DMOJ](#) to prove her skill! Confident, Lelei opens the sixth problem of the October 2015 DMOPC and finds a really abstract problem with no story. So she decides to make one up and tell **FatalEagle** to add it to the problem. Anyway, here's the original problem:

Rory is playing with an array  $A$  consisting of  $N$  integer elements indexed from 1 to  $N$  and a positive integer  $M$ . Rory will perform  $Q$  operations. Each operation is either type 1 or type 2.

Type 1 operation is in the form  $1\ l\ r\ x$ . You should add  $x$  to each element in  $A[l], A[l+1], \dots, A[r]$ .

Type 2 operation is in the form  $2\ l\ r$ . You should output the sum  $(A[l]^M + A[l+1]^M + \dots + A[r]^M) \bmod M$ .

Lelei is confident she can solve this problem, so she tells you that she doesn't need your help, as she can solve it faster than you. Seeing this as a challenge, you obviously want to show Lelei that she could have a better time penalty, if only she asked for your help. Can you prove her wrong?

## Input Specification

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The first line of input will contain three integers  $M$ ,  $N$ , and  $Q$ .

The second line of input will contain  $N$  elements, the original elements of array  $A$  in the order  $A[1], A[2], \dots, A[N]$ .

The next  $Q$  lines of input will contain an operation, either in the form  $1\ l\ r\ x$  for an operation of type 1 or  $2\ l\ r$  for an operation of type 2.

## Constraints

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For all subtasks:

$$0 \leq A[i] \leq 10^5 \text{ for all valid } i$$

$$1 \leq l \leq r \leq N$$

$$1 \leq x \leq 10^5$$

### Subtask 1 [15%]

$$M = 2$$

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

### Subtask 2 [15%]

$$M = 2$$

$$1 \leq N, Q \leq 100\,000$$

### Subtask 3 [15%]

$$M = 3$$

$$1 \leq N, Q \leq 100\,000$$

#### Subtask 4 [15%]

$$M = 5$$

$$1 \leq N, Q \leq 100\,000$$

#### Subtask 5 [40%]

$$M = 10\,007$$

$$1 \leq N, Q \leq 200\,000$$

### Output Specification

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For each operation of type 2, output the answer on a new line.

### Sample Input

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2 5 3
1 2 3 4 5
2 1 4
1 2 5 7
2 1 5
```

### Sample Output

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```
0
1
```

### Explanation

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For the first operation,  $1^2 + 2^2 + 3^2 + 4^2 = 30$ , and  $30 \equiv 0 \pmod{2}$ .

For the second operation, the array  $A$  is now  $1, 9, 10, 11, 12$ .

For the third operation,  $1^2 + 9^2 + 10^2 + 11^2 + 12^2 = 447$  and  $447 \equiv 1 \pmod{2}$