

USACO 2024 DECEMBER CONTEST, BRONZE  
PROBLEM 2. FARMER JOHN'S CHEESE BLOCK

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Time Remaining: 0 hrs, 58 min, 59 sec

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

<div><div>*</div><div>1</div><div>3.3mb 2ms</div></div>	<div><div>*</div><div>2</div><div>3.3mb 3ms</div></div>	<div><div>*</div><div>3</div><div>3.3mb 3ms</div></div>	<div><div>*</div><div>4</div><div>3.3mb 3ms</div></div>	<div><div>*</div><div>5</div><div>3.6mb 3ms</div></div>	<div><div>*</div><div>6</div><div>3.6mb 3ms</div></div>	<div><div>*</div><div>7</div><div>3.4mb 3ms</div></div>	<div><div>*</div><div>8</div><div>26.0mb 382ms</div></div>	<div><div>*</div><div>9</div><div>26.0mb 382ms</div></div>	<div><div>*</div><div>10</div><div>26.0mb 383ms</div></div>	<div><div>*</div><div>11</div><div>26.0mb 382ms</div></div>	<div><div>*</div><div>12</div><div>26.0mb 375ms</div></div>
				<div><div>*</div><div>13</div><div>26.0mb 381ms</div></div>	<div><div>*</div><div>14</div><div>26.0mb 373ms</div></div>	<div><div>*</div><div>15</div><div>3.6mb 339ms</div></div>	<div><div>*</div><div>16</div><div>8.7mb 345ms</div></div>				

English (en)

Farmer John has a block of cheese in the shape of a cube. It lies on the 3-dimensional coordinate plane, extending from  $(0, 0, 0)$  to  $(N, N, N)$  ( $2 \leq N \leq 1000$ ). Farmer John will perform a series of  $Q$  ( $1 \leq Q \leq 2 \cdot 10^5$ ) update operations to his cheese block.

For each update operation, FJ will carve out the 1 by 1 by 1 block of cheese extending from integer coordinates  $(x, y, z)$  to  $(x + 1, y + 1, z + 1)$ , where  $0 \leq x, y, z < N$ . It is guaranteed that there will exist a 1 by 1 by 1 block of cheese at the location FJ carves. Since FJ is playing Moocraft, gravity does not cause parts of the cheese to fall if cheese below is carved.

After each update, output the number of distinct configurations that FJ can stick a 1 by 1 by  $N$  brick in the cheese block such that no part of the brick overlaps with any remaining cheese. Every vertex of the brick must have integer coordinates in the range  $[0, N]$  for all three axes. FJ may rotate the brick however he wants.

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

The first line contains  $N$  and  $Q$ .

The following  $Q$  lines contain  $x, y$ , and  $z$ , the coordinates to be carved.

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

After each update operation, output an integer, the number of configurations.

SAMPLE INPUT:

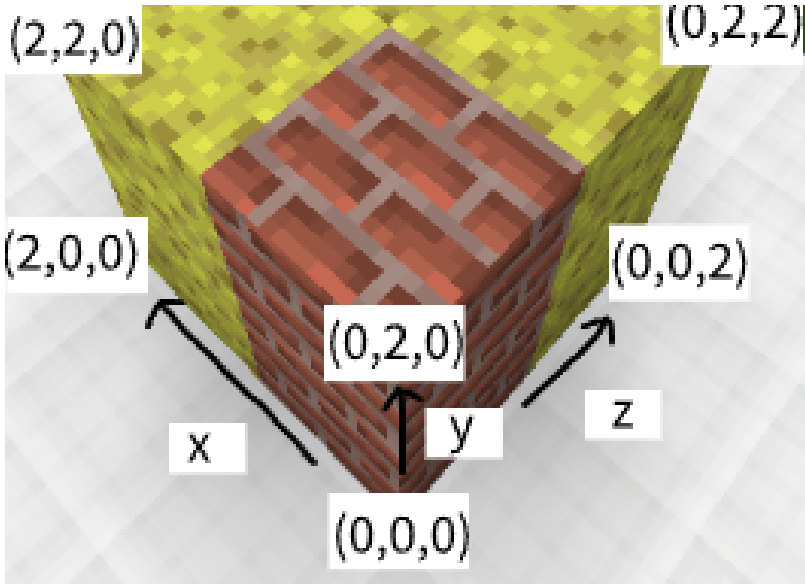
```
2 5
0 0 0
1 1 1
0 1 0
1 0 0
1 1 0
```

SAMPLE OUTPUT:

```
0
0
1
2
5
```

After the first three updates, the  $1 \times 2 \times 1$  brick spanning  $[0, 1] \times [0, 2] \times [0, 1]$  does not overlap with the remaining cheese, so it contributes toward the answer.





SCORING:

- Inputs 2-4:  $N \leq 10$  and  $Q \leq 1000$
- Inputs 5-7:  $N \leq 100$  and  $Q \leq 1000$
- Inputs 8-16: No additional constraints

Problem credits: Chongtian Ma, Alex Liang

Language: 

C

Source File: 

Choose File

 No file chosen

Submit Solution

Previous Submissions:

[Sun, Dec 15, 2024 18:28:36 EST \(C++17\)](#)  
[Sun, Dec 15, 2024 18:29:22 EST \(C++17\)](#)  
[Sun, Dec 15, 2024 18:31:15 EST \(C++17\)](#)