1st North African Olympiad in Informatics
2025

Dox Taurus Cows

Time limit: 1 second **Memory limit: 256 MB**

Ifamu ishaje ya sogokuru Porcellesi ishobora kwerekanwa nka $N \times M$ grid (izitiye, cyangwa se muyandi magambo, ifite mo ibikuta), aho buri kazu gahagarariye hegitare y'ubutaka. Imirongo itambitse y'utuzu yitwa imibare kuva kuri 0 kugeza $N-1$ kuva hejuru kugera hasi, naho imirongo ihagaze y'utuzu yitwa imibare kuva kuri 0 kugeza $M-1$ kuva ibumoso ujya iburyo.

Porcellesi yari yapanze kuzitira ubuso (areas) butandukanye akurikije buno buryo: Mugihe hakiri ubuso bwa rectangle busigaye, Porcellesi azitira ubuso bwa square bunini bushoboka ahereye mu nguni yo hejuru ibumoso ya ya rectangle yasigaye. Bityo rero, buri buso bwose buzitiye ni square.

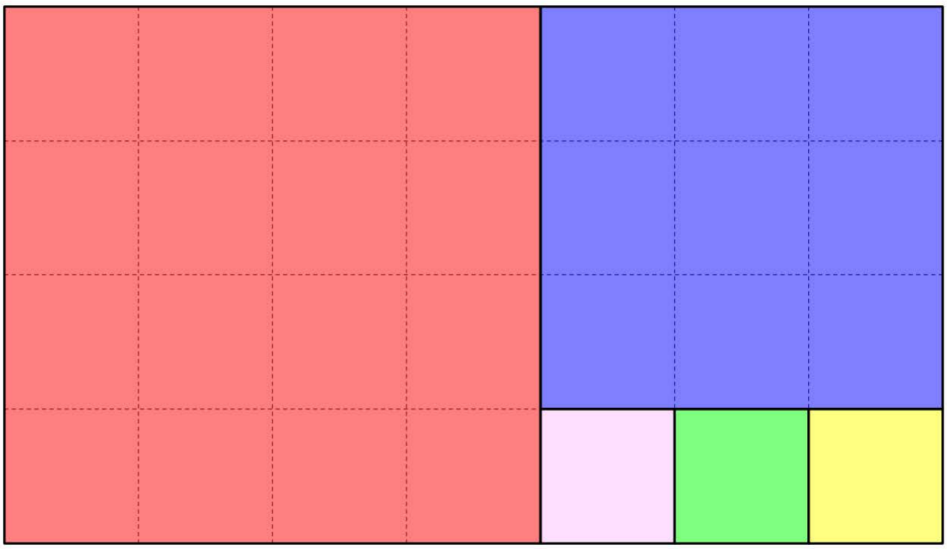


Figure 1: Urugero rw'ifamu ifite $N = 4$ na $M = 7$.

Tutitaye k'uburyo budasanzwe ino famu iteyemo, iyi famu ibamo inka zizi ubwenge: **Dox Taurus**. Izi nka, zizwi nka **quantum cows**, zifite ububasha bwo kubura zikaboneka kubushake bwazo.(Bitewe n'uku kuntu zimeze, inka ishobora kugenda ijya mubuso buzitiye butandukanye.)

Sogokuru Porcellesi yafashe umwanzuro wo kureba ukuntu inka zigenda: byumwihariko, azajya yandika buri gihe inka itungukiye cyangwa iburiye mukazu kari mw'ifamu.

Kubwimpamvu z'imikorere y'ifamu ye, arashaka kumenya umubare w'inka zizaba ziri mubuso bumwe buzitiye bufite inka nyinshi kuruta ubundi buso bwose, igihe icyo aricyo cyose abishakiye.

Problem Description

Urahabwa inshingano z'ibintu ugomba gukora Q, buri nshingano ifite ubwoko bumwe muri ubu butatu:

- `add (r, c)`: gushyira inka mukazu (r, c)

- `remove (r, c)`: gukura inka mukazu (r, c)
- `count`: kuvuga umubare w'inka ziri mubuso buzitiye bufite inka nyinshi kuruta ubundi buso bwose.

Fasha Sogokuru Porcellesi gusohoza **inshingano za Dox Taurus cows**!

Input

Input ifite imirongo $Q + 1$:

- **Umurongo wa 1**: Integers N, M, Q
- **Imirongo** $(1 + i)$ aho $(1 \leq i \leq Q)$: Ubusobanuro bw'inshingano:
  - `a r c`: Gushyira inka mukazu (r, c)
  - `t r c`: Gukura inka mukazu (r, c)
  - `c`: Kuvuga umubare w'inka ziri mubuso buzitiye bufite inka nyinshi kuruta ubundi buso bwose.

Output

Output ifite **imirongo** C, aho C ari umubare w'inshingano z'ubwoko bwa `count`:

- **Umurongo** wa i: agaciro k'umubare wabonye usohoza inshingano ya i^{th} y'ubwoko bwa `count`

Constraints

- $1 \leq N, M \leq 10^{18}$
- $0 \leq Q \leq 200,000$
- $0 \leq r < N$, $0 \leq c < M$ kuri buri nshingano
- Ifamu itangira ntanka irimo (itangira irimo ubusa).
- Buri nshingano yo gukura inka mukazu nuyihabwa bivuze ko izaba ishoboka (muri ako kazu hazaba harimo byibuze inka imwe).

Subtasks

Subtask	Points	Constraints
1	0	Ingero batanze gusa
2	11	$N \leq 50$, $M \leq 50$, $Q \leq 500$
3	21	$N \leq 50$, $M \leq 50$, $Q \leq 20,000$
4	20	N ni multiple ya M
5	27	$Q \leq 500$
6	21	Ntazindi constraints ziyongereyeho

Ingero

Urugero rwa 1

```
4 7 8
a 2 1
a 1 4
a 0 5
a 3 5
c
t 0 5
a 3 5
c
```

Output:

```
2
2
```

Urugero rwa 2

```
13 9 17
a 10 5
a 11 8
c
a 9 6
c
t 10 5
c
a 11 8
a 11 8
c
t 11 8
t 11 8
c
a 9 0
a 9 4
a 10 1
c
```

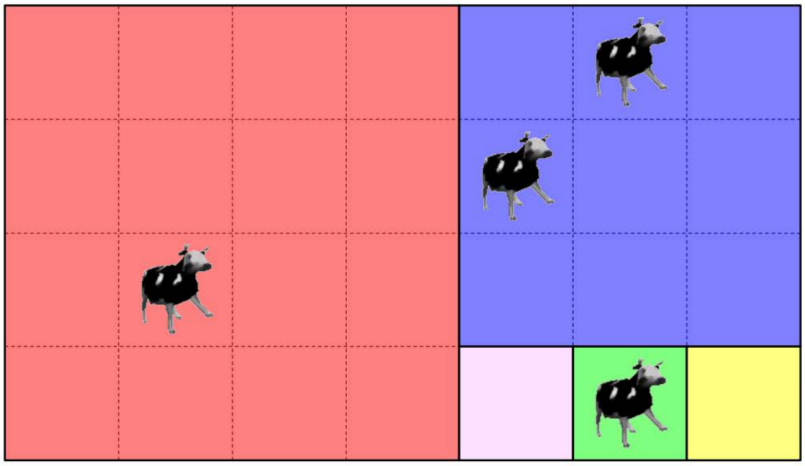
Output:

```
1
2
1
3
1
2
```

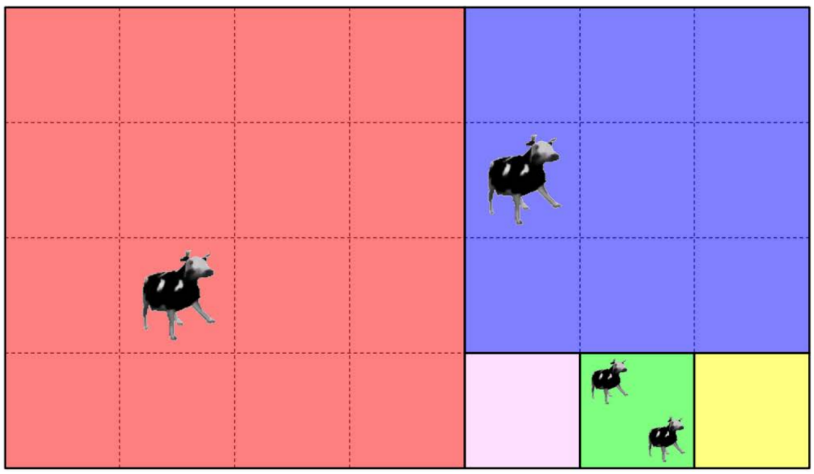
Ubusobanuro

Murugero rwa mbere:

- Ifamu itangira **irimo ubusa**
- Nyuma yo gusohoza inshingano 4 zambere, ifamu iba imeze gutya:
  - Ubuso buzitiye bwo **hejuru-iburyo** bufite **inka** 2.
  - Inshingano yambere y'ubwoko bwa `count` nituyisohoza tuzavuga 2.



- Nyuma yo gusohoza inshingano zakurikiraga, ubuso buzitiye bufite inka nyinshi harimo **inka** 2.



Inshingano y'akabiri y'ubwoko bwa `count` nituyisohoza tuzavuga 2.