Tower Power (Full)

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	1024 megabytes

King Ansew rules over the land of Cardinalia. The kingdom is divided into a rectangular grid of land plots, with m rows (East-West) and n columns (North-South).

King Ansew has decided to erect k towers to defend Cardinalia. Each tower takes up an entire land plot, and will have four cannons pointing North, South, East and West. Each cannon can fire any distance in its given direction up to the next tower in that direction or the border of Cardinalia; King Ansew does not want his own towers destroyed, nor to start wars with the neighbouring kingdoms.

The *power* of a tower is the total number of land plots that all four of its cannons can safely fire into.

As the towers are built *one by one*, advise King Ansew of the power of each tower *at the time it is built*.

Input

The first line of input consists of three space-separated integers, m, n ($1 \leq m, n \leq 1,000,000,000$) and k ($1 \leq k \leq 100,000$), representing the number of rows, columns and towers respectively.

k lines follow, the ith of which consists of two space-separated integers, r_i ($1 \leq r_i \leq m$) and c_i ($1 \leq c_i \leq n$), representing the row and column of the ith tower. No two towers have the same position.

Output

For each tower, output a single integer, the number of plots that the new tower can fire into.

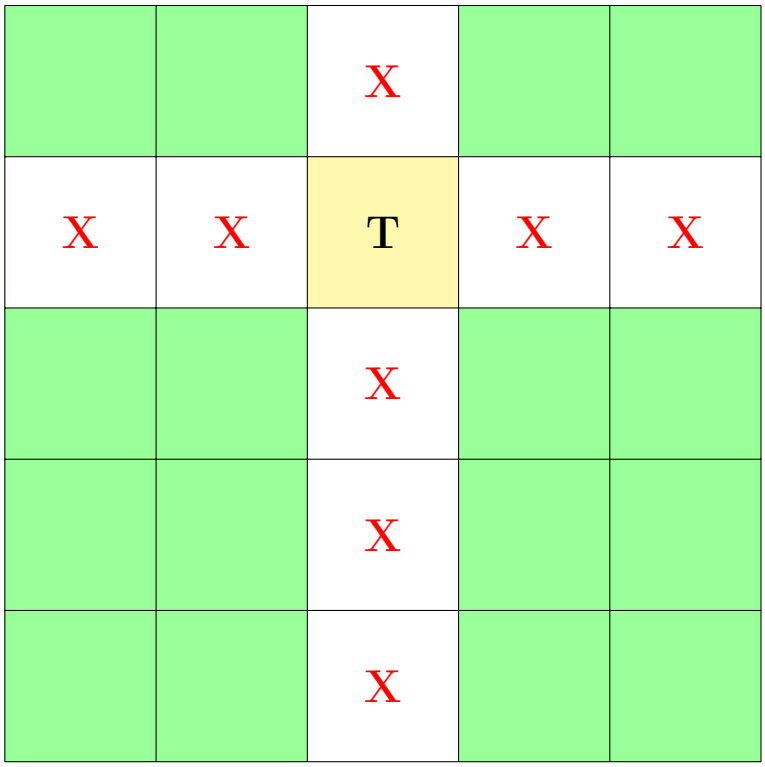
Examples

standard input	standard output
5 5 5 2 3 4 3 2 5 5 5 5 3	8 6 5 6 3
2 3 4 1 1 1 3 2 2 2 3	3 2 3 0

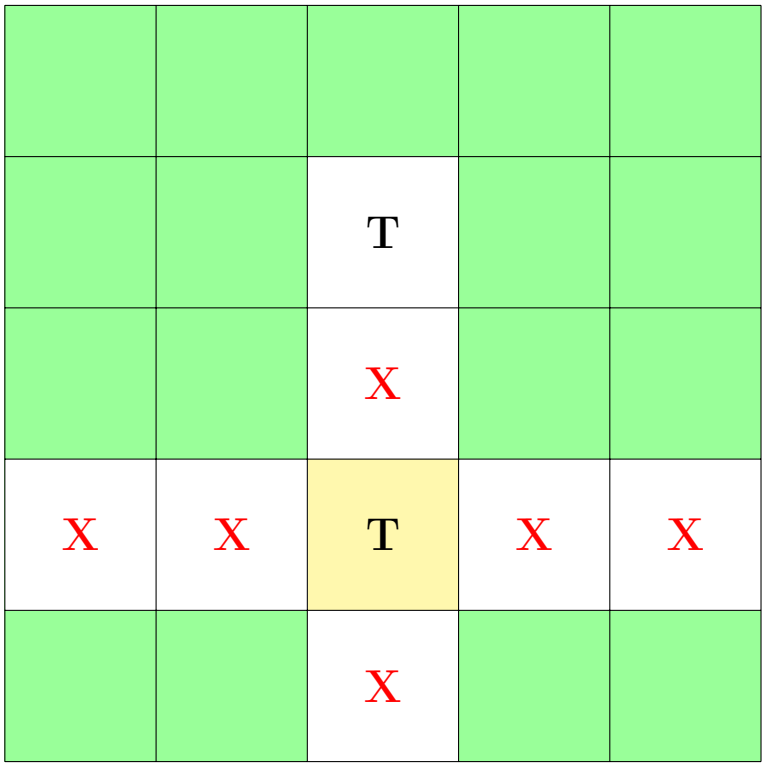
Note

In the first sample case there are five rows and five columns.

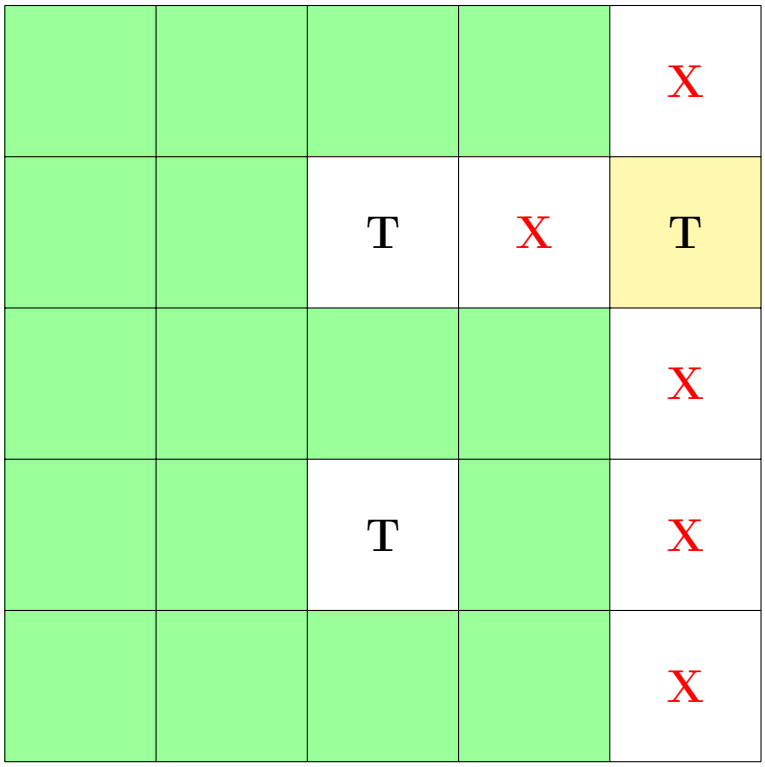
The first tower is in row 2 and column 3. It can fire West to two plots, East to two plots, North to one plot and South to three plots, each time constrained by the borders of Cardinalia. Therefore it has 8 power.



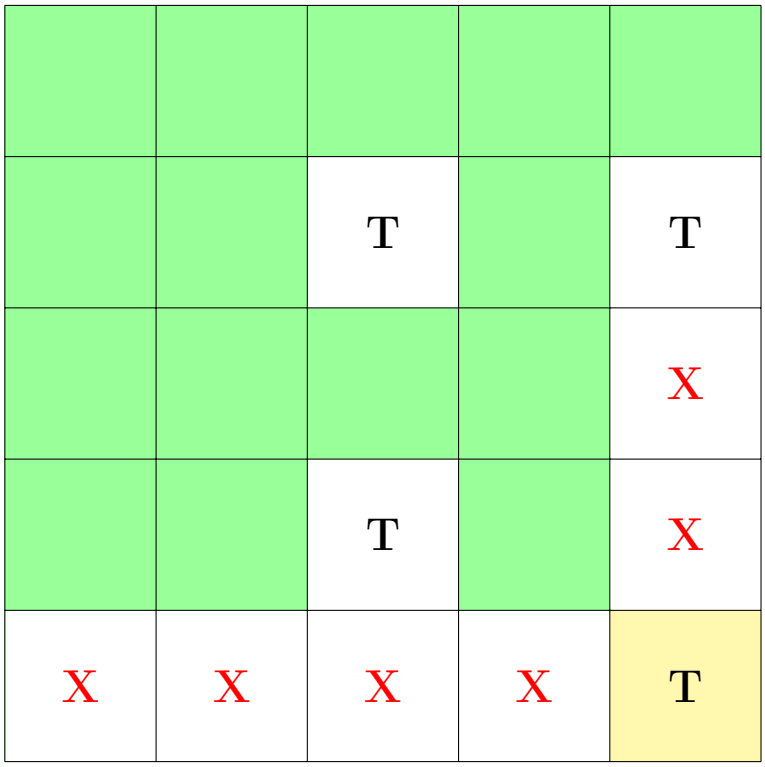
The second tower is in row 4 and column 3. It can again fire West, South and East to the borders of Cardinalia, but this time it can only fire one plot North; any further range is blocked by the previous tower. Its power is 6.



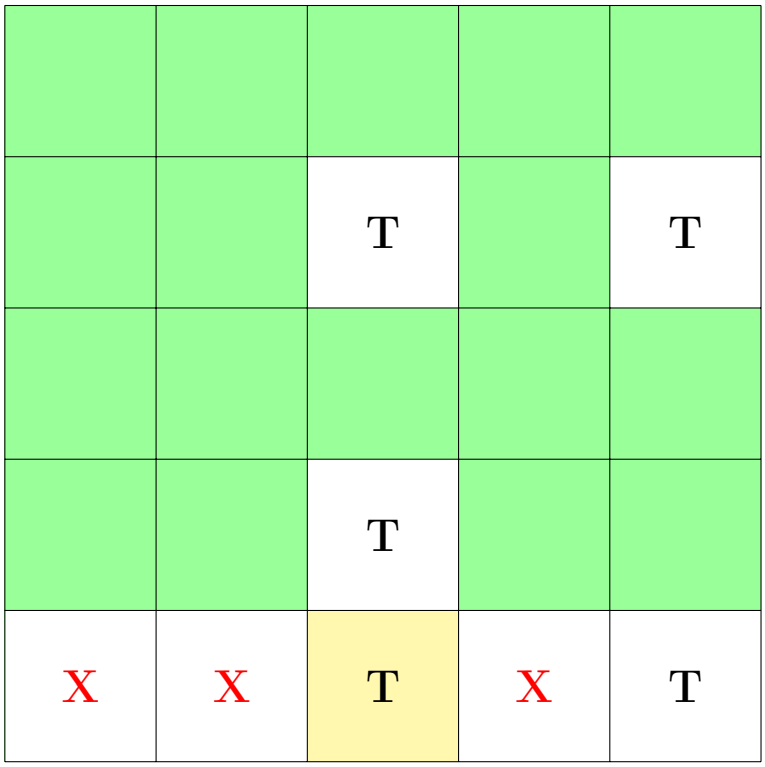
The third tower is in row 2 and column 5. It can fire West up to the first tower, and North and South unconstrained. It is already on the East border of Cardinalia, so it cannot fire any further East. Its power is 5.



The fourth tower is in row 5 and column 5. It cannot fire any further South or East as it is already in the southeast corner. It can fire North up to the previous tower and West for the entire width of Cardinalia. Its power is 5.

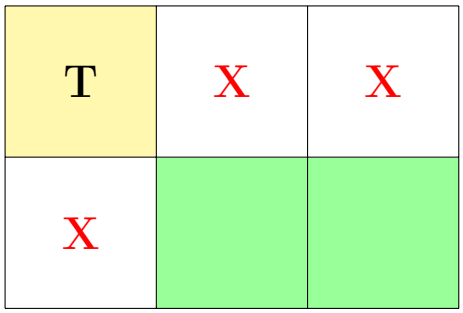


The fifth tower is in row 5 and column 3. It can fire East to the fourth tower, West to the border or North to the second tower. Its power is 3.

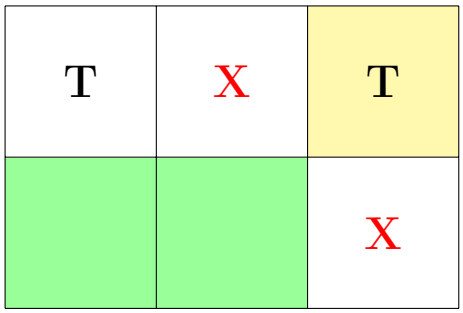


In the second sample case there are two rows and three columns.

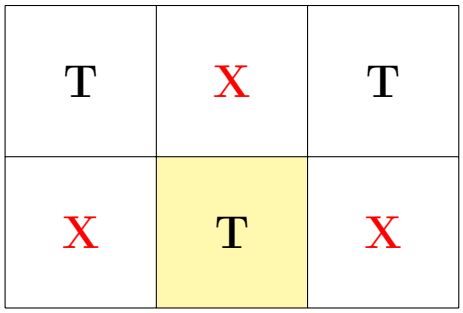
The first tower is in row 1 and column 1. It cannot fire North or West as it is already in the northwest corner. It can fire South one plot or East two plots, for a total power of 3.



The second tower is in row 1 and column 3. It cannot fire North or East, and it can fire one plot South or West, so its power is 2.



The third tower is in row 2 and column 2. It cannot fire South, and it can fire one plot in any of the other three directions, so its power is 3.



The fourth tower is in row 2 and column 3. It is surrounded by other towers on two sides and the borders of Cardinalia on the other two sides, so its power is 0.

