Rotate

SEASON 6 – ROUND TWO – 100 points

Ivancho and his friends like playing strange games. One of these games is called Rotate-a-palooza.

In this game N^2 of Ivancho's friends arrange so they form a square with side **N** (so that each of Ivancho's friends occupies the space of a 1x1 square) and Ivancho instructs them to rotate around in various ways, like by row, by column, or by diagonal. Your task is to write a program, which answers queries of the type „Which one of Ivancho's friends occupies position **(i, j)** after all rotations are completed?". Since Ivancho has too many friends and couldn't possibly remember all their names, he has nicknamed them all with the numbers from **1** to N^2. As an example, if 2^2 of Ivancho's friends participate in the game, their initial arrangement would look like this:

1	2
3	4

Ivancho gives his instructions in the following way:
<rotation_type> <position> <number_of_rotations>

Every rotation is given in the following way:

Type of rotation:

1. ‚r' specifies a rotation of a row
2. 'c' specifies a rotation of a column
3. 'd' specifies a rotation of a straight diagonal[1]
4. 'x' specifies a rotation of a backward diagonal[2]

Position is given by:

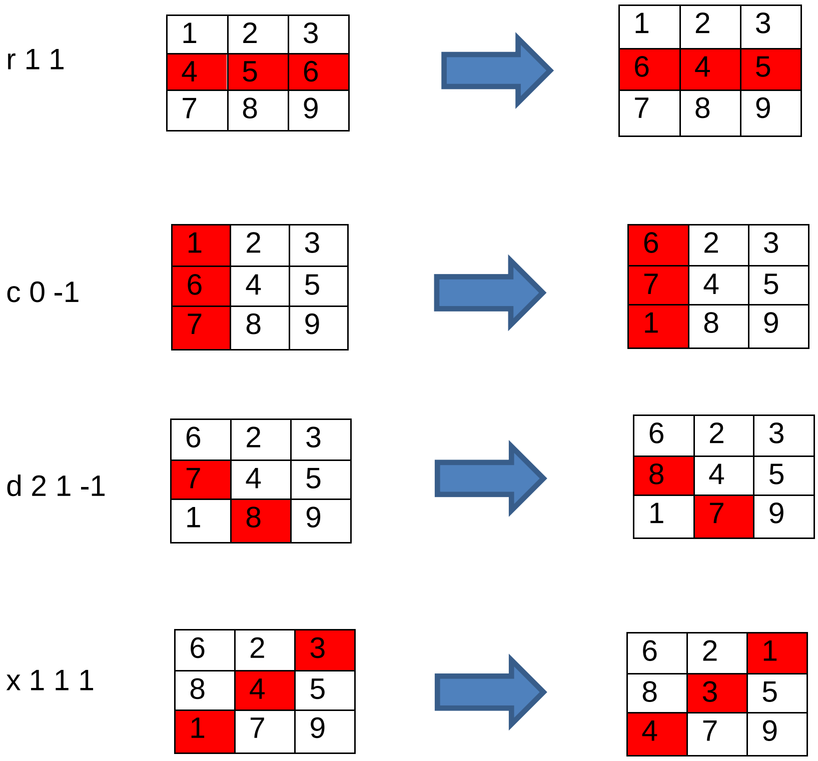
1. In the cases 'r' and 'c' – a single positive integer **T**, specifying the row/column, to be rotated ($0 \leq T \leq n-1$)
2. In the cases 'd' and 'x' – two positive integers **R** and **C** specifying a diagonal to be rotated (this specifies a single diagonal, which contains the cell **(R,C)**)

Number of rotations is specified:

1. By a single integer **k** ($-1000 <= k < 1000$)

When one of Ivancho's friends needs to rotate from a boundary position (i.e. from an (n-1)-th position to the next) we assume that his friend loops back around to the 0-th position again)

For example:



r 1 1

1	2	3
4	5	6
7	8	9

→

1	2	3
6	4	5
7	8	9

c 0 -1

1	2	3
6	4	5
7	8	9

→

6	2	3
7	4	5
1	8	9

d 2 1 -1

6	2	3
7	4	5
1	8	9

→

6	2	3
8	4	5
1	7	9

x 1 1 1

6	2	3
8	4	5
1	7	9

→

6	2	1
8	3	5
4	7	9

Input

The first row of the file `rotate.in` contains the integer, N – the side of the square, which Ivancho's friends form.

The next row contains the integer R – the number of rotations, which will be performed.

The next R lines contain the rotations in the described above format.

The next line contains the integer Q – the number of queries of the type „Which one of Ivancho's friends is at position **(i, j)** after all rotations have been completed?“.

Each of the next Q lines contains two integers i and j

Output

In the output file `rotate.out` print a single positive integer for each query – the number in position **(i, j)** after all rotations have been completed.

Constraints

$1 \le N \le 1000$

$1 \le \mathrm{R} \le 10^4$

$1 \le Q \le 10^5$

$0 \le \mathrm{T} \le \mathrm{n-1}$

$0 \le \mathrm{R},\ \mathrm{C} \le \mathrm{n-1}$

$-1000 \le k \le 1000$

$0 \le \mathrm{i},\ \mathrm{j} \le \mathrm{n-1}$

Time limit: 0.7 sec
Memory limit: 256 MB

Example test:

Input (rotate.in)	Output (rotate.out)
3	6
	3
4	7
r 1 1	
c 0 -1	
d 2 1 -1	
x 1 1 1	
3	
0 0	
1 1	
2 1	

Clarifications

1. A „main diagonal“ of a matrix is the diagonal, containing all cells which lay on the same number row and column (i.e. (0,0) (1,1) … (n-1),(n-1)). A „straight diagonal“ is a diagonal, parallel to the main diagonal. Rotations happen “downward” when k > 0 and “upward” when k < 0, e.g. after d 0 0 1, a_{00} takes the place of a_{11}, a_{11} takes the place of a_{22} etc. After d 0 0 -1 a_{00} takes the place of $a_{n-1,n-1}$ etc.

2. A “reverse diagonal” of a matrix is the diagonal, containing all cells with indices (i, n-i-1), e.g. the cells with indices (0,3),(1,2),(2,1),(3,0) comprise the reverse diagonal of a 4x4 matrix. A “backward diagonal” is a diagonal, parallel to the reverse diagonal. Rotations happen “downward”, when k > 0 and “upward”, when k < 0.