

Constellation

Problem Description

Three characters { #, *, . } represents a constellation of stars and galaxies in space. Each galaxy is demarcated by # characters. There can be one or many stars in a given galaxy. Stars can only be in shape of vowels { A, E, I, O, U }. A collection of * in the shape of the vowels is a star. A star is contained in a 3x3 block. **Stars cannot be overlapping**. The dot(.) character denotes empty space.

Given 3xN matrix comprising of { #, *, . } character, find the galaxy and stars within them.

Note: Please pay attention to how vowel A is denoted in a 3x3 block in the examples section below.

Constraints

$3 \leq N \leq 10^5$

Input

Input consists of single integer N denoting number of columns.

Output

Output contains vowels (stars) in order of their occurrence within the given galaxy. Galaxy itself is represented by # character.

Time Limit

1

Examples

Example 1

Input

18

```
*.*#****#***#***.*.  
*.*#*.**#.**.#*****  
***#***#***#***.*
```

Output

U#O#I#EA

Explanation

As it can be seen that the stars make the image of the alphabets U, O, I, E and A respectively.

18

* . * # * * * # * * * # * * * , * .
* . * # * . * # . * . # * * * # * * *
* * * # * * * # * * * # * * * # * * * , *

Example 2

Input

12

* . * # . * * * # . * .

* . * # . . * . # * * *

* * * # . * * * # * . *

Output

U#I#A

Explanation

As it can be seen that the stars make the image of the alphabet U, I and A.

12

* . * # . * * * # . * .
* . * # . . * . # * * *
* * * # . * * * # * . *

SudoCube

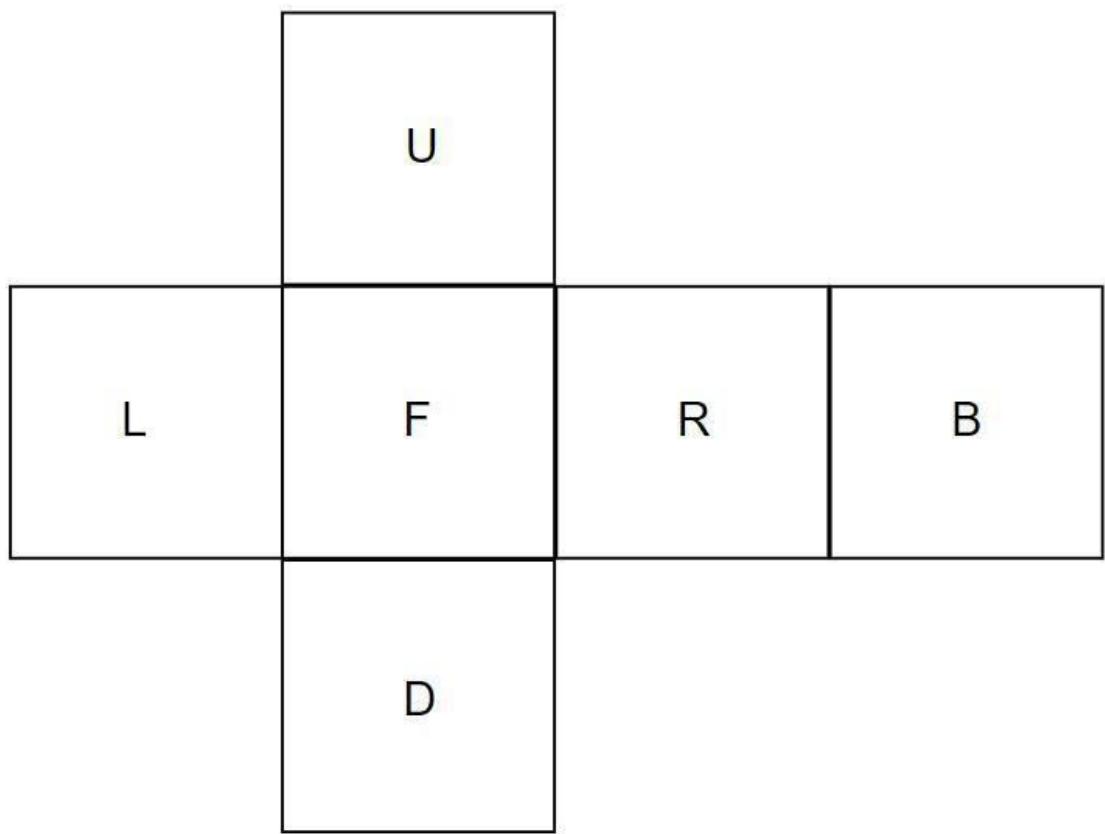
Problem Description

John, a research scholar / Professor / Puzzle solver wants your help in publishing his work on SudoCube on his online blog for his followers and students.

A SudoCube is a mixture of Rubics cube and Sudoku. A SudoCube has exactly 6 appearances of every digit from 1 to 9 across the cube, whereas Rubics cube has 6 different colours.

As John wants to publish his work in text /document form (no video) he's concerned how he would depict the step by step work of rotation in 2D form. Following are the notions and concepts John follows:

1. The six faces of the cube are named FRONT, BACK, UP, DOWN, LEFT and RIGHT respectively.
2. Just like a Rubics cube which move in 90 and 180 degrees in both clockwise and anti clockwise directions, so can the SudoCube
3. Any given face of the cube is a 3x3 square matrix whose indices are denoted by (0,0) to (2,2). Diagram below illustrates the same.
4. An elementary move is denoted in the following fashion.
 - i. If a given face is rotated by 90 degrees clockwise about the axis passing from the centre of the face to the centre of the cube, the move is denoted by the first letter of the name of the face.
 - ii. If the rotation is anticlockwise by 90 degrees, the letter is followed by an apostrophe (').
 - iii. If the rotation is by 180 degrees, the letter is followed by a 2.



Above image display the position of the faces

	(0,0)	(0,1)	(0,2)													
	(1,0)	(1,1)	(1,2)													
	(2,0)	(2,1)	(2,2)													
(0,0)	(0,1)	(0,2)	(0,0)	(0,1)	(0,2)	(0,0)	(0,1)	(0,2)	(0,0)	(0,1)	(0,2)					
(1,0)	(1,1)	(1,2)	(1,0)	(1,1)	(1,2)	(1,0)	(1,1)	(1,2)	(1,0)	(1,1)	(1,2)					
(2,0)	(2,1)	(2,2)	(2,0)	(2,1)	(2,2)	(2,0)	(2,1)	(2,2)	(2,0)	(2,1)	(2,2)					
			(0,0)	(0,1)	(0,2)											
			(1,0)	(1,1)	(1,2)											
			(2,0)	(2,1)	(2,2)											

Above diagram displays the indices of the matrix on the faces

John wants to test his notations on you. He has given you the initial position of the SudoCube and he has given you a set of operations to be performed on the SudoCube basis his notation. After applying all the operations, the final SudoCube state should be the same as what John expects. Your task is to apply the operations and print the final SudoCube state.

Constraints

Values in SudoCube will be between 1 and 9

No of moves < 15

Input

- First eighteen lines contain the values of the faces on SudoCube in the order given below

D D D

D D D

D D D

U U U

U U U

U U U

L L L

L L L

L L L

F F F

F F F

F F F

R R R

R R R

R R R

B B B

B B B

B B B

where

- D for Down face
- U for upper face
- L for Left face
- F for Front face
- R for Right face
- B for Back face.

Input contains digits from 1 to 9 instead of letters; letters are displayed for better understanding of the faces and the expected input format

- Nineteenth line contains a sequence of space delimited moves that need to be performed on the SudoKube

Example 1: D F2 R' U - to understand this please refer second example from the *Examples* section below

Example 2: L2 U B F' D2 R - lets understand how to interpret this set of operations

- L2 means rotate the Left side by 180 degrees
- U means rotate the Up side by 90 degrees clockwise
- B means rotate the Back side by 90 degrees clockwise

- F' means rotate the Front side by 90 degrees anticlockwise
- D2 means rotate the Down side by 180 degrees
- R means rotate the Right side by 90 degrees clockwise

In summary, first eighteen lines denotes the state of the SudoCube, 19th line denotes the operation to be performed on that state and output should be the resulting state.

Output

Print 3x3 matrix corresponding to the order (D, U, L, F, R, B). Between every 3x3 matrix there should be a new line.

Time Limit

1

Examples

Example 1

Input

4 7 1

2 8 7

6 3 5

5 8 3

3 1 6

9 4 2

5 2 4

3 7 8

5 1 9

6 1 4

9 4 8

2 5 7

7 9 1

1 9 6

6 2 8

8 6 3

7 2 5

3 9 4

F

Output

6 1 7

2 8 7

6 3 5

5 8 3

3 1 6

9 8 4

5 2 4

3 7 7

5 1 1

2 9 6

5 4 1

7 8 4

9 9 1

4 9 6

2 2 8

8 6 3

7 2 5

3 9 4

Explanation:

The output shows the state of SudoCube when the front side is rotated clockwise

Example 2

Input

4 7 1

2 8 7

6 3 5

5 8 3

3 1 6

9 4 2

5 2 4

3 7 8

5 1 9

6 1 4

9 4 8

2 5 7

7 9 1

1 9 6

6 2 8

8 6 3

7 2 5

3 9 4

D F2 R' U

Output

2 4 5

3 8 9

5 7 6

4 3 5

2 1 8

8 7 6

9 1 3

3 7 1

3 9 7

1 6 7

8 4 6

4 1 6

1 6 3

9 9 5

4 8 4

5 2 2

7 2 5

9 2 8

Explanation

The above output prints the state of cube after D F2 R' U operation are performed. Here

- D means rotate the Down side by 90 degrees clockwise
- F2 means rotate the Front side by 180 degrees
- R' means rotate the Right side by 90 degrees anti clockwise
- U means rotate the Up side by 90 degrees clockwise