ECOO '12 R2 P4 - Lo Shudoku

Time limit: 1.0s **Memory limit:** 64M

Jenny is obsessed with 3×3 Magic Squares. In case you have forgotten, a 3×3 Magic Square contains all integers from 1 to 9 arranged so that every row, column, and diagonal adds up to the same number. The earliest known Magic Square is the Lo Shu Square (shown at right) discovered in China more than 2600 years ago. There are only 7 other 3×3 Magic Squares, all obtained by rotation and reflection of the original Lo Shu Square:

4	9	2
3	5	7
8	1	6

8	1	6
3	5	7
4	9	2

6	1	8
7	5	3
2	9	4

4	3	8
9	5	1
2	7	6

2	7	6
9	5	1
4	3	8

2	9	4
7	5	3
6	1	8

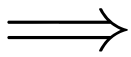
6	7	2
1	5	9
8	3	4

8	3	4
1	5	9
6	7	2

Jenny's friends have learned not to leave their Sudoku puzzles unattended when she's around. She will take any fully or partially completed Sudoku puzzle she finds and play a game of her own invention called "Lo Shudoku", in which she transforms the 9×9 Sudoku board into a set of nine Magic Squares using a restricted set of moves. Then she writes down a "Lo Shudoku" square in the margin that shows the number of moves she used for each of the nine squares:

Original Sudoku Board

	1		5	9	6	8	7	3
9			4	1	3			6
		5	8	7	2	4	1	9
1	7	2		4			9	
8	6	3	2	5	9			
5	4	9		6			3	8
7	2	6	9	8	4	3	5	1
3			1					4
4	9	1	6	3	5	7	8	2



Jenny's Transformation

8	1	6	4	9	2	4	9	2
3	5	7	3	5	7	3	5	7
4	9	2	8	1	6	8	1	6
2	9	4	8	3	4	2	9	4
7	5	3	1	5	9	7	5	3
6	1	8	6	7	2	6	1	8
8	1	6	8	3	4	8	1	6
3	5	7	1	5	9	3	5	7
4	9	2	6	7	2	4	9	2

Jenny's "Lo Shudoku" Square

8	5	6
5	7	7
4	6	7

When she plays Lo Shudoku, Jenny works on each of the nine 3×3 squares, turning them into Magic Squares one by one. When transforming a 3×3 square, she always uses as few moves as possible, and she always proceeds in two separate phases:

1. First, she fills in all the blank spaces with the remaining integers from 1 to 9. Each number filled in counts as one move.
2. Once all the blanks are filled, she repeatedly swaps pairs of integers until she has a Magic Square. Each swap counts as one move.

When she has transformed each square in this way, she produces her Lo Shudoku square showing the number of moves she used to create each of the nine Magic Squares. In the example above, the Lo Shudoku square shows that the top left Magic Square took 8 moves, the ones to its right and beneath it took 5 moves each, and so on.

Here is one way that Jenny could transform top right 3×3 square from the example above:

8	7	3

8	7	3

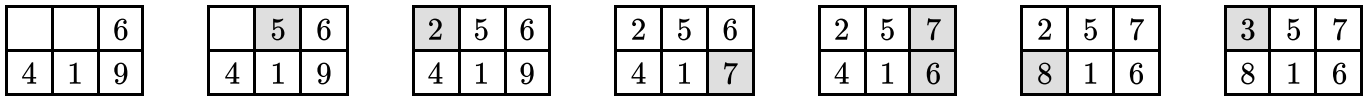
8	7	3

8	9	3

8	9	3

4	9	3

4	9	2



In phase one she fills in the 5 and 2 first, then in phase two she makes 4 swaps to complete the Magic Square. This is not the only way she could have made a Magic Square from the original numbers, but there is no shorter path to a Magic Square than this. She records this minimum number of moves (6) in the top right corner of her Lo Shudoku square.

The input contains 5 test cases. Each test case will consist of 9 lines of 9 digits, representing a Sudoku board. The Sudoku board might be completely filled in, or it might be partially filled in. If it is partially filled in, the blank spaces will be represented as zeros. Your program must output a Lo Shudoku square for each Sudoku board given. For ease of reading, each Lo Shudoku square should be followed by `---`.

Sample Input

```
010596873  329847651  206004900  093006500  000050086
900413006  748561392  040900100  652830070  649300070
005872419  156392478  900800002  007500036  000640100
172040090  514726839  700045090  000060108  030021009
863259000  673985124  064389270  000908000  106000708
549060038  892413765  090120004  501040000  400980030
726984351  965138247  400003008  140002600  008072000
300100004  287654913  005008020  060097315  060003852
491635782  431279586  003500407  009600280  250060000
```

Sample Output

```
856
577
467
---
655
443
525
---
787
878
888
---
688
988
977
---
888
787
778
---
```