

Sudoku Solver

Filename: sudoku.java

Standard Input, Standard Output

The Problem

Sudoku Puzzles have recently caught on as a hot new item amongst games in newspapers. The game is as follows:

- 1) You are given a 9x9 grid, with some squares filled in with positive integers in between 1 and 9, inclusive.
- 2) Your goal is to complete the grid with positive integers in between 1 and 9, inclusive, so that each row, column and mini 3x3 square that is designated contain each integer in the range 1 through 9 exactly once.

Below is an example of a Sudoku puzzle:

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

(taken from www.sudoku.com on 11:45am on 2/1/06)

Here is the puzzle solved:

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

Your program will read in a file of sudoku puzzles, all of which either have no solution or a unique solution. You will output to the screen for each test case, either the filled in game board, or the statement, "No solution possible."

Input Format

The first line of the input file will be a positive integer n , representing the number of puzzles to solve in the input file. This will be followed by a blank line. The following $10n$ lines will contain the n cases, with each case taking exactly 10 lines. Within each test case, the i^{th} line will contain the 9 values on the i^{th} row of the unsolved puzzle, in order, from left to right, each separated by spaces. This will be followed by the 10th line that is blank. In particular, all blank entries of the puzzle will be indicated with a 0, and the 9 integer values (all in between 0 and 9, inclusive) on the line each will be separated by a space.

Output Format

The first line for each test case will be of the format:

Test case k:

where k ranges in between 1 and n , inclusive and represents the test case number. Follow this with a blank line.

If the puzzle has no solution, then the line of output after the blank line will be:

No solution possible.

If the puzzle has a solution, output it on the following nine lines, with each value separated by a single space. For the puzzle above the output would be:

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

Follow the output for each test case with two blank lines.

Sample Input

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```
0 6 0 1 0 4 0 5 0
0 0 8 3 0 5 6 0 0
2 0 0 0 0 0 0 0 1
8 0 0 4 0 7 0 0 6
0 0 6 0 0 0 3 0 0
7 0 0 9 0 1 0 0 4
5 0 0 0 0 0 0 0 2
0 0 7 2 0 6 9 0 0
0 4 0 5 0 8 0 7 0
```

```
0 6 0 1 0 4 0 5 0
0 0 8 3 0 5 6 0 0
2 0 0 0 0 0 0 0 1
8 0 0 4 0 7 0 0 6
0 0 6 0 0 0 3 0 0
7 0 0 9 0 1 0 0 4
5 0 0 0 0 0 0 0 2
0 0 7 2 0 6 9 0 0
0 4 0 5 0 8 0 7 9
```

Sample Output

Test case 1:

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

Test case 2:

No solution possible.