CS209A Tutorial Week 10

Sudoku is a number puzzle, typically composed of a 9 x 9 grid (also called “board”) with digits so that each column, each row, and each of the nine 3 x 3 sub-grids that make up the grid (also called "boxes") contain all of the digits from 1 to 9. Puzzles provide a partially completed board, in which the player needs to find a solution for.

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

Figure 1: Example of a Sudoku puzzle

In the puzzle above, for instance, the cell on the 6th column of the 1st row needs to have a value of 8. The fact that there’s already a cell with value of 8 on the 3rd row, and another cell with value of 8 on the 4th column, leaves just a single cell in the second box that could possibly hold the value 8.

This week you need to implement a Sudoku solver.

You need to read the input from the console:

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

Output the solution:

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

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

Order-4 Sample:

```
4
 0  0  0  0  0  0  2 15  0  0  0  1  0  4  0  0
 0  0  0  0  0  0  1  0  0  0 16  8  0  0  0  2
 7  0  0  0 16 12  0  0  0  0  0  0  1  3  0  0
 0  0  6  1  0  0  8  9 14 11  0  0 13  0  0  7
 0  0  0  0  0  0  0  0 11 14  0 10  2  0  0 13
 3  0  2  8  0  5 12  4  0  0  0 13  0 11  0  6
 0  6 11  0 15  1 14 10  0  0  0  0  0  0  8 16
 0  0  1  0  0  0  0 16  0  5 12  0  0  0 14  0
 1  0  0 10  0  0  0  0  0 16  2  0  3  0  0  0
 0  9  0  0  0 14  0  2 15  8  0 12  0 13  0  0
 0  0  7  0  0  0  0  0  1  0  0  0 10 16  0  9
 0 16  0  0  0  8  0  0  7  0  0  0  0  0  0 12
 0  0  0  0  0  2 15  0  4 12  0  0  0  0  0  0
 0 11  8  0 13  0  0  0  0  0  0  0  6  0  2  4
 0  0  5  0  0 16  0  8  0  9  0 15  0  0  0  0
 9 13  0 15  0  0  0 11  3  0  7  2 14  0  0  1
```

Output:

```
 5  3 10 16 11 13  2 15  6  7  9  1  8  4 12 14
13  4 15 11 10  7  1 14 12  3 16  8  5  6  9  2
 7  8 9  14 16 12  5  6  2 10 13  4  1  3 11 15
12  2  6  1  4  3  8  9 14 11 15  5 13 10 16  7
16  5 12  7  8  6  9  3 11 14  4 10  2  1 15 13
 3 14  2  8  7  5 12  4 16 15  1 13  9 11 10  6
 4  6 11 13 15  1 14 10  9  2  3  7 12  5  8 16
15 10  1  9  2 11 13 16  8  5 12  6  4  7 14  3
 1 15 13 10  9  4  7 12  5 16  2 11  3 14  6  8
 6  9  4  3  1 14 16  2 15  8 10 12 11 13  7  5
 8 12  7  2  6 15 11  5  1 13 14  3 10 16  4  9
11 16 14  5  3  8 10 13  7  4  6  9 15  2  1 12
10  7  3  6  5  2 15  1  4 12  8 14 16  9 13 11
14 11  8 12 13  9  3  7 10  1  5 16  6 15  2  4
 2  1  5  4 14 16  6  8 13  9 11 15  7 12  3 10
 9 13 16 15 12 10  4 11  3  6  7  2 14  8  5  1
```

Before your work on the practice, you'd better go through < HillClimbingAndSimulatedAnnealing.pdf > and read the paper : https://www.researchgate.net/publication/220403361_Metaheuristics_can_solve_Sudoku_puzzles