## Problem 3:

Given a  $9\times9$  incomplete sudoku, solve it such that it becomes valid sudoku. Valid sudoku has the following properties.

- 1. All the rows should be filled with numbers(1 9) exactly once.
- 2. All the columns should be filled with numbers(1 9) exactly once.
- 3. Each  $3\times3$  submatrix should be filled with numbers(1 9) exactly once. def is\_valid(grid, row, col, num):

```
for i in range(9):
    if grid[row][i] == num:
       return False
  for i in range(9):
    if grid[i][col] == num:
       return False
  start_row = 3 * (row // 3)
  start_col = 3 * (col // 3)
  for i in range(3):
    for j in range(3):
      if grid[start_row + i][start_col + j] == num:
         return False
  return True
def solve_sudoku(grid):
  for row in range(9):
    for col in range(9):
      if grid[row][col] == '.':
         for num in range(1, 10):
           if is_valid(grid, row, col, str(num)):
              grid[row][col] = str(num)
              if solve_sudoku(grid):
                return True
```

```
grid[row][col] = '.'
return False
```

```
return True

input_grid = [

['5', '3', '.', '.', '7', '.', '.', '.', '.'],

['6', '.', '.', '1', '9', '5', '.', '.', '.'],

['3', '3', '8', '.', '.', '.', '6', '.'],

['4', '.', '.', '8', '.', '3', '.', '.', '1'],

['7', '.', '.', '.', '2', '.', '.', '6'],

['.', '6', '.', '.', '.', '.', '2', '8', '.'],

['.', '.', '.', '4', '1', '9', '.', '.', '5'],

['.', '.', '.', '.', '8', '.', '.', '7', '9']

]

solve_sudoku(input_grid)
```

for row in input\_grid:

```
print(''.join(row))

Imput

input

1 9 8 3 4 2 5 6 7

8 5 9 7 6 1 4 2 3

4 2 6 8 5 3 7 9 1

7 1 3 9 2 4 8 5 6

9 6 1 5 3 7 2 8 4

2 8 7 4 1 9 6 3 5

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