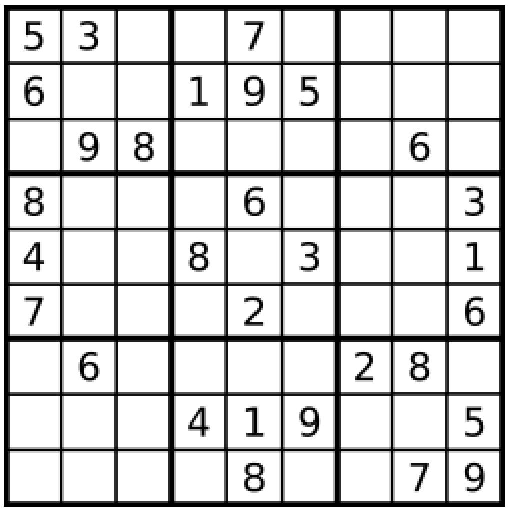
65. **Write a program to solve a Sudoku puzzle by filling the empty cells.**

A sudoku solution must satisfy all of the following rules:

1. **Each of the digits 1-9 must occur exactly once in each row.**
2. **Each of the digits 1-9 must occur exactly once in each column.**
3. **Each of the digits 1-9 must occur exactly once in each of the 9 3x3 sub-boxes of the grid.**

The '.' character indicates empty cells.

Example 1:



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

Input: board =
[["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"]]

Output:
[["5","3","4","6","7","8","9","1","2"],["6","7","2","1","9","5","3","4","8"],["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"]]

Explanation: The input board is shown above and the only valid solution is shown below:

AIM: To Solve the Sudoku Puzzle

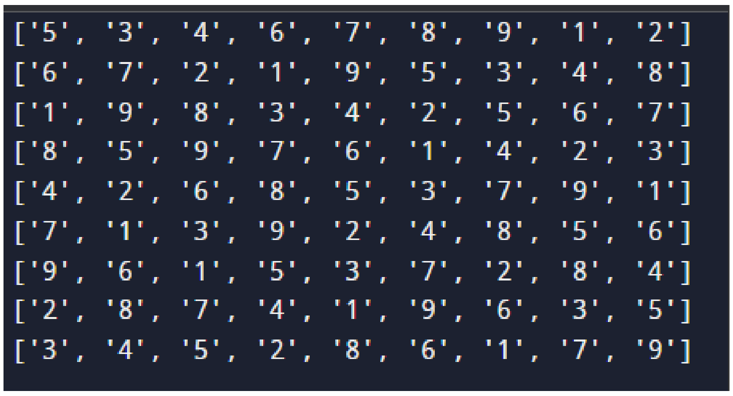
PROGRAM:

```
def solveSudoku(board):
    def isValid(row, col, num):
        # Check if the number can be placed at the given position
        for i in range(9):
            if board[row][i] == num or board[i][col] == num or board[(row//3)*3 + i//3][(col//3)*3 +
i%3] == num:
                return False
        return True

    def backtrack():
        for i in range(9):
            for j in range(9):
                if board[i][j] == '.':
                    for num in map(str, range(1, 10)):
                        if isValid(i, j, num):
                            board[i][j] = num
                            if backtrack():
                                return True
                            board[i][j] = '.'
                    return False
        return True

    backtrack()

board = [
    ["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"]
]
solveSudoku(board)
for row in board:
    print(row)
```

OUTPUT: 

```
['5', '3', '4', '6', '7', '8', '9', '1', '2']
['6', '7', '2', '1', '9', '5', '3', '4', '8']
['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']
```

TIME COMPLEXITY: O(9^m)