CS245-Sudoku
A 9 x 9 sudoku puzzle generator using recursion and backtracking.

Sudoku is a number-placement puzzle. The objective is to fill a 9 × 9 grid with digits so that each column, each row, and each of the nine 3×3 subgrids that compose the grid (also called "boxes", "blocks", or "regions") contains all of the digits from 1 to 9. The puzzle setter provides a partially completed grid, which for a well-posed puzzle has a single solution.

The goal is to generate a randomized Sudoku puzzle.
 Generated from a beginning state:

```
(0, 0)
7 placed
 -----------------------
| 7 0 0 | 0 0 0 | 0 0 0 |
| 0 0 0 | 0 0 0 | 0 0 0 |
| 0 0 0 | 0 0 0 | 0 0 0 |
 -----------------------
| 0 0 0 | 0 0 0 | 0 0 0 |
| 0 0 0 | 0 0 0 | 0 0 0 |
| 0 0 0 | 0 0 0 | 0 0 0 |
 -----------------------
| 0 0 0 | 0 0 0 | 0 0 0 |
| 0 0 0 | 0 0 0 | 0 0 0 |
| 0 0 0 | 0 0 0 | 0 0 0 |
 -----------------------
```

By recursively testing solutions for each 3 x 3 subgrid
 (5, 4)

```
3 placed
 -----------------------
| 7 1 9 | 5 8 2 | 0 0 0 |
| 3 6 8 | 4 7 9 | 0 0 0 |
| 2 4 5 | 6 1 3 | 0 0 0 |
 -----------------------
| 1 9 4 | 2 5 8 | 0 0 0 |
| 8 5 3 | 1 4 7 | 0 0 0 |
| 6 2 7 | 9 3 0 | 0 0 0 |
 -----------------------
| 4 8 2 | 0 0 0 | 0 0 0 |
| 5 7 6 | 0 0 0 | 0 0 0 |
| 9 3 1 | 0 0 0 | 0 0 0 |
 -----------------------
```

```
 ## Resetting the subgrid if all solutions are extinguished
on the current randomized path.
 (3, 3)
8 placed
 ----------------------
| 7 1 9 | 5 8 2 | 0 0 0 |
| 3 6 8 | 4 7 9 | 0 0 0 |
| 2 4 5 | 6 1 3 | 0 0 0 |
 ----------------------
| 1 9 4 | 8 0 0 | 0 0 0 |
| 8 5 3 | 0 0 0 | 0 0 0 |
| 6 2 7 | 0 0 0 | 0 0 0 |
 ----------------------
| 4 8 2 | 0 0 0 | 0 0 0 |
| 5 7 6 | 0 0 0 | 0 0 0 |
| 9 3 1 | 0 0 0 | 0 0 0 |
 ----------------------
```

```
 ## Until a solution is reached, repeating this pattern to
generate a valid Sudoku puzzle.
 (6, 5)
5 placed
 ----------------------
| 7 1 9 | 5 8 2 | 0 0 0 |
| 3 6 8 | 4 7 9 | 0 0 0 |
| 2 4 5 | 6 1 3 | 0 0 0 |
 ----------------------
| 1 9 4 | 8 5 6 | 0 0 0 |
| 8 5 3 | 9 2 7 | 0 0 0 |
| 6 2 7 | 3 4 1 | 0 0 0 |
 ----------------------
| 4 8 2 | 7 9 5 | 0 0 0 |
| 5 7 6 | 0 0 0 | 0 0 0 |
| 9 3 1 | 0 0 0 | 0 0 0 |
 ----------------------
```

```
# Final Game Board
 ----------------------
| 7 1 9 | 5 8 2 | 4 6 3 |
| 3 6 8 | 4 7 9 | 2 1 5 |
| 2 4 5 | 6 1 3 | 7 9 8 |
 ----------------------
| 1 9 4 | 8 5 6 | 3 7 2 |
| 8 5 3 | 9 2 7 | 6 4 1 |
| 6 2 7 | 3 4 1 | 8 5 9 |
 ----------------------
| 4 8 2 | 7 9 5 | 1 3 6 |
| 5 7 6 | 1 3 8 | 9 2 4 |
| 9 3 1 | 2 6 4 | 5 8 7 |
 ----------------------
```