

Homework 3: Solving Sudoku Solving

Due September 25th at 10pm

Part 1: Solving Sudoku (80 points)

Your goal is to finish your Sudoku solver from last week.

Finishing Your Implementation

You should continue with your implementation from last week. I suggest implementing the remaining functions in the following order:

1. Implement `next_boards`, which returns a list of possible next boards. To do so, (1) pick a cell that has a minimal number of available values, and (2) place each available value in that cell. **IMPORTANT: Use `Board.copy` so that each next board is independent!**
2. Implement `Board.is_solved` and `Board.is_unsolvable`. A board is solved if every cell is constrained to exactly one value. Similarly, a board is unsolvable if any cell is constrained to the empty set of values (i.e., nothing can be placed in that cell).
3. Implement `board.solve`. If `board.is_solved` is true, then return `board`. If it is unsolvable, return `None`. Otherwise, iterate through the list of next boards, recursively applying `solve`, and return the first board that is solved.

The starter code also includes some tests with boards that your solver should be able to solve. These tests only check that a solution is found. **They do not check that the solution is correct.**

Testing Solution Correctness

Your last task is to write a function to check whether a solved board is really correct. Implement `check_solution`. This function should take a board and check to make sure that it is valid Sudoku solution: each digit appears exactly one in every row, column, and square.

Part 2: Reading Reflections

These questions ask you to reflect on Chapters 2-3 of *You Look Like A Thing And I Love You*.

Question 1 (10 points)

Given what you learned in Chapter 2 about the limitations of AI models, discuss how difficult you think the following problems would be:

- Generate image captions for an album of family vacation photos
- Given several episodes of an animated TV show, identify fan art of various characters online

- Given an unfinished novel by a prolific author, generate an ending for the work

Question 2 (10 points)

In Chapter 3, Shane describes how to use neural networks to generate sandwich recipes. We'll learn more about this technique later in the class. For the moment, consider tackling this as a search problem, where the states are layers of a sandwich: the start state is a piece of bread.

How would you define the following components of the search problem?

- Goal state
- Transition function
- Cost function