CS 4300 - Fall 2022 - Minh Nguyen
Final Project - PEAS Assessment

Project: Sudoku Solver using Propositional Logic:

1. **Description & Rules:**
   - Sudoku is a number game consisting of a 9 × 9 grid
   - The player can use only numbers from 1 to 9.
   - Each 3×3 block can only contain numbers from 1 to 9.
   - Each vertical column can only contain numbers from 1 to 9.
   - Each horizontal row can only contain numbers from 1 to 9.
   - Each number in the 3×3 block, vertical column or horizontal row can be used only once.
   - The game is over when the whole Sudoku grid is correctly filled with numbers.
   - In the start state, the board must have at least 17 numbers filled (as clues)

2. **The Percepts (Sensors):**
   - The board, which has all rows, columns, the currently filled numbers and their locations

3. **The Actions (Actuators):**
   - Choose a number from 1-9 and fill it in an open space on the board
   - Do a search and to find the solutions

4. **The Environment:**
   a. Observability:
      i. Fully observable
      ii. The board with its rows and columns are known. The filled numbers with their locations and the empty spaces are known. The possible numbers to select are from 1-9 (known)

   b. Uncertainty:
      i. Deterministic.
      ii. Filling a number in a square means that that number cannot be used again in its 3x3 block, its vertical column, and its horizontal row

c. Duration:
    i. Episodic.
    ii. The agent, after seeing the initial state of the Sudoku board, can explore the solutions and complete the board in one go

d. Stability:
    i. Static
    ii. The environment will not change, and there are no factors that affect the decision of the agent

e. Granularity:
    i. Discrete
    ii. A number can be filled in a specific space (if it is valid)

f. Participants:
    i. Single agent
    ii. One agent is sufficient solve this problem (hopefully)

g. Knowledge:
    i. Known
    ii. The board with its rows and columns are known. The filled numbers with their locations and the empty spaces are known. The possible numbers to select are from 1-9 (known)

5. Intended Search Strategy:

- Turn the Sudoku game into a constraint satisfaction problem
- Apply propositional logic to solve it
- Another outcome from finishing the game/problem is to learn and understand Prolog and how it can be applied to solve other problems