**Sudoku Puzzle Program Planning Part 2 (Python Program)**

* Get the puzzle
  + Ask for the size of puzzle, and create a 3D array for that size (N x N x N)
    - String array of String array of String array list
  + For each empty index of the array, ask user to insert the corresponding number from the sudoku into it
  + Use a visual pointer as reference
  + If the corresponding index is blank (no numbers), just press “ENTER”
  + After each box, check with user for accuracy
    - Enter in coordinate points to create corrections if needed
* Get possible candidates for each cell
  + For each cell, look at its row, column, and block to eliminate already-existed candidate
  + Each array list in a cell will now contain a list of candidates
* Solve the puzzle
  + Helpful Resources:
    - Top Nine Most Often Used Strategies for Solving Expert Sudoku Puzzles (YouTube – RFC963)
    - <https://www.instructables.com/id/Solve-Sudoku-Without-even-thinking!/#:~:text=%20Step%201%3A%20What%20You%20Need%20to%20Begin,pencil.%203%20Step%204%3A%20Erase%20Down%20More%20>
    - <https://www.pennydellpuzzles.com/wp-content/uploads/2019/03/How-to-Solve-Sudoku.pdf>
  + Methods (the Basics):
    - Naked Singles
      * Cell with only one candidate
      * Eliminate repeating candidate in the same row, column, and box
    - Hidden Singles
      * Only candidate of a multicandidate cell in a row, col, OR box
      * Eliminate repeating candidate in the same row, column, and box
    - Self-proclaimed method (from XY-Wing)
      * Once a number for a cell is found, look at its row and column to see if the number exists
      * If number on row or column does exist and that cell only have one other candidate, that candidate is the answer for that cell
  + Methods (the Advanced):
    - Naked Pairs
      * Two cells in a row, col, or box contains the same candidates PAIRS
      * Eliminate repeating candidates in the same row, column, and box
    - Pointing pairs (Triples)
      * When a certain candidate only appears in two or three cells aligned in a row or column
      * Said candidates outside the block in the same row or column can be eliminated
    - Claiming Pairs (Triples)
      * When a certain candidate appears in only two/three cells in a row or column and the cells are located within the same block
      * Eliminate repeating candidates in the same block
    - ~~Naked Triples~~
    - X-Wings (?)
      * When a candidate appears in four cells that makes a rectangle, and it only appears in the two cells in its row/col
      * Eliminate all other said candidates in the col/row
      * “In the example at right, the 9 in column 1 can only be in row E or row G, and the 9 in column 7 also can only be in row E or row G. If the 9 in column 1 is in row E, the 9 in column 7 must therefore be in row G, and if the 9 in column 1 is in row G, the 9 in column 7 must therefore be in row E. Therefore, the 9 cannot be in any other cells in rows E and G but E1, E7, G1, or G7 (or we would not be able to place the 9s in columns 1 and 7), so we can eliminate the 9s from all other cells in those two rows.” (Sudoku Solving Tips).
    - Hidden Pairs
      * When a pair of candidates appears in only two cells in a row, column, or a block, and the cell contains other candidates
      * Eliminate all candidates in the cells other than the pairs
      * Execute Naked Pair
    - ~~Naked Quads~~
    - ~~Locked Candidate~~
    - ~~XY-Wing~~
    - ~~XY-Wing (With a Right Angles)~~
    - ~~XY-Wing (Regular [Without a Right-Angles])~~
    - ~~Swordfish~~
  + Approach:
    - Find the first cell with multiple candidates
    - Apply above method
    - Move on to next available cell
    - Take note of the very first cell with more than one candidate
      * this way, program knows where to start after traversing through puzzle
* Print out solution puzzle

