CSE 410 - AI: Homework 3

This homework will have, both a short written and coding assignment. The problems that are supposed to be written are clearly marked.

1) **(30) (Written) Define Sudoku CSP** Clearly define the formulation of a the CSP for a Sudoku problem, assuming only binary constraints. What are the variables, domains, constraints. How many are there of each? You can add a diagram if that helps.

2) **(30) AC3 Algorithm** Use the supplied code that defines the Sudoku CSP in order to implement the AC3 algorithm. The function should be part of the `Solver` class that you submit. Implement the AC3, that will take a CSP as in input and reduce its domains. It should return `True` if there are any possible assignments left, and `False` if the algorithm concludes the CSP cannot be solved.

3) **(40) Backtracking Search** Implement a backtracking search for solving a Sudoku puzzle. It should take a a Sudoku instance and return either `None` or a valid assignment. In the supplied test cases, the easy case can be solved with a regular backtracking search. However, for harder cases the search might take a long time. The version you submit should include the AC3 algorithm as an inference step. i.e. after each new assignment run AC3 on the problem to either shrink the domains or prune the search branch. This approach is also called *maintaining arc consistency* (mac) approach to inference.