

**PROBLEM SET 1: DUE THURSDAY SEPT. 24**

**\* Only a hard copy of your solutions will be accepted (NO EMAIL SOLUTIONS, PLEASE!!!).**

**Problem 1.1** (~2 pages; 4 points)

In Searle's paper "Minds, Brains, and Programs", he considers--and rejects--a variety of responses to his "Chinese Room" thought experiment. Do any of these responses seem to you particularly compelling or provocative? If not, are there any (pro or con) arguments about the Chinese room that you think are more interesting?

**Problem 1.2** (10 points)

In lecture, we discussed a Sam Loyd "milk transfer" puzzle, which goes as follows: There are four cans, of capacity 40 quarts, 40 quarts, 5 quarts, and 4 quarts, respectively. The two forty-quart cans are filled; the other two are empty. By transferring milk between the cans (without spilling, and without any measuring device), find a way of getting two quarts into the five-quart can and two quarts into the four-quart can. The standard rule here is that any transfer of milk must fill the target can, empty the source can, or both.

1.2a (1 point)

Solve the puzzle and show the solution path.

1.2b (2 points)

Find the exact number of achievable states in this puzzle. (That is, find the number of vertices in the graph representing the problem space.)

1.2c (4 points)

Write a program to solve the puzzle via depth-first search, and show a transcript of the running program. Your program should clearly indicate the order in which problem states are explored in the course of solving the puzzle. Describe any specific decisions that you make regarding (e.g.) the representation of a puzzle state, ways of dealing with "loops", and so forth. Once you have this working, alter your program so that it uses iterative depth-first search (increasing the depth limit of search at each stage). Estimate how much longer the iterative version takes to solve the puzzle than your original DFS version.

1.2d (3 points)

Write a program to solve the puzzle via breadth-first search. Again, show the order in which problem states are explored.