

## CSE630 – Inclass exercise on Search

- 1) Choose a team of 3-4 people.
- 2) In your team, first do the warm-up problem together, then choose one of problems A, B, or C to formulate as a search problem. In a search problem, you must define the following:
  - a. State variables
  - b. State the goal or write out the pseudocode for the goaltest function
    - o Make sure your goaltest is defined as a function from state variables to True/False
  - c. Operators: what actions are defined and what states each action can be performed in
  - d. State the solution (sequence of actions) for the given problem instance.

### 0. Warm-up exercise

To get started, first do this simple warm-up exercise to make sure you know how to formulate a search problem:

You have 2 water jugs, one of 3 gallon capacity and one of 7 gallon capacity. Water can be added to or poured from the jugs. Water can be added to either jug by either pouring the water from one jug to another, or they can be filled from a faucet with an infinite water supply. The goal is to have exactly one gallon of water in the smaller jug.

### Problem A: Buckeye fans trounce Wolverine fans

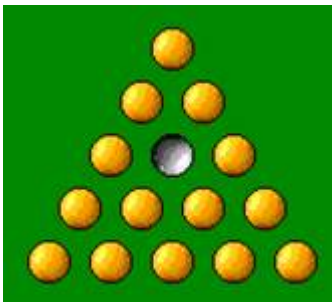
There are 3 Buckeye fans and 3 Michigan fans on one side of a river, trying to get across to the other side to escape being attacked by a pack of zombies. There is only one boat, at most 2 people at a time can fit in the boat. The boat must be rowed by one person for it to cross the river. If at any point in time there are more Buckeye fans than Michigan fans on either side of the river, the Buckeye fans will berate the Michigan fans, causing permanent psychological damage. The problem is to get all 6 people across the river without ever having more Buckeye fans than Michigan fans on one side of the river.

### Problem B: Determine names for kinship relations between two people

You have a large database containing id's for people and the id's of their parents. Given any two people in the database, determine the label for the name of their kinship relation (sibling, parent, grandparent, uncle, cousin, etc.) if they are close enough to have a named relationship. Write out a list of relationships and a couple of example named-relation search solutions.

### Problem C: Triangular Peg Solitaire Puzzle

Traditional 5-on-a-side Triangle Peg Solitaire. 15 peg holes are in a triangular hex grid as follows:



All 15 holes have pegs except for one central vacant hole. Pegs are removed via linear jump. A peg which jumps over an adjacent peg to an empty peg hole immediately beyond in the same direction results in the removal of the jumped peg. The goal is to have only one peg remaining on the board.

Goal: Exactly one peg remains after all others have been removed.

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Here is an additional problem to try to formulate after you read Chapter 4:

**Problem D: Create a crossword puzzle**

Given a list of words and a grid like that shown on the right, Generate a crossword puzzle.

