

Tutorial 3 & 4:
Solving Problems by Searching

Question 1:

Define in your own words the following terms: state, state space, search tree, search node, goal, action, transition model, and branching factor.

Question 2:

Give a complete problem formulation for each of the following problems. Choose a formulation that is precise enough to be implemented.

- a. There are six glass boxes in a row, each with a lock. Each of the first five boxes holds a key unlocking the next box in line; the last box holds a banana. You have the key to the first box, and you want the banana.
- b. A container ship is in port, loaded high with containers. There 13 rows of containers, each 13 containers wide and 5 containers tall. You control a crane that can move to any location above the ship, pick up the container under it, and move it onto the dock. You want the ship unloaded.

Question 3:

Give a complete problem formulation for each of the following. Choose a formulation that is precise enough to be implemented.

- a. Using only four colors, you have to color a planar map in such a way that no two adjacent regions have the same color.
- b. A 3-foot-tall monkey is in a room where some bananas are suspended from the 8-foot ceiling. The monkey would like to get the bananas. The room contains two stackable, movable, climbable 3-foot-high crates.

Question 4:

Consider a state space where the start state is number 1 and each state k has two successors:
numbers $2k$ and $2k + 1$.

- a. Draw the portion of the state space for states 1 to 15.
- b. Suppose the goal state is 11. List the order in which nodes will be visited for breadthfirst search, depth-limited search with limit 3, and iterative deepening search.