

1. our book AIMA, 3.7 (a,b)

Give the initial state, goal test, successor function, and cost function for each of the following. Choose a formulation that is precise enough to be implemented.

- a.** You have to color a planar map using only four colors, 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. He would like to get the bananas. The room contains two stackable, movable, climbable 3-foot-high crates.

2. AIMA 3.8

Consider a state space where the start state is number 1 and the successor function for state n returns two states, numbers $2n$ and $2n + 1$.

- 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 breadth-first search, depth-limited search with limit 3, and iterative deepening search.
- c.** Would bidirectional search be appropriate for this problem? if so, describe in detail how it would work.
- d.** What is the branching factor in each direction of the bidirectional search?
- e.** Does the answer to (c) suggest a reformulation of the problem that would allow you to solve the problem of getting from state 1 to a given goal state with almost no search?

3. AIMA , 3.12

Prove that breadth-first search with constant step costs are optimal when used with the GRAPH-SEARCH algorithm. Show a state space with varying step costs in which GRAPH-SEARCH using iterative deepening finds a suboptimal solution.