

## QUESTION 1:

**State:** a snapshot that represents the problem at any moment

**State space:** all states contained together

**Search tree:** a “tree” that consist of all the elements that could be searched

**Search node:** element that holds data

**Goal:** what you want the end result to be

**Action:** the options the agent can do based on the current state

**Transition model:** the things you do within an action that changes a state

**Branching factor:** offspring per node

## QUESTION 2:

**A:**

**1.) What a representation of a ‘state’ is:** a map that holds a “list” of all the countries that either hold one of the four colors or no color at all

**2.) What a reasonable initial state is:** a list of countries that hold no color

**3.) The actions you can take:** doing the bigger countries first and color it a color thats not its adjacent color

**4.) The transition model:** coloring a non colored country, making it a colored country, leaving all the other countries in the state they were previously in before they country was colored

**5.) The cost function:** no cost function because theres the same amount of steps for coloring the countries

**6.) The goal test:** all the countries are not sharing the same color with their adjacent country

**B:**

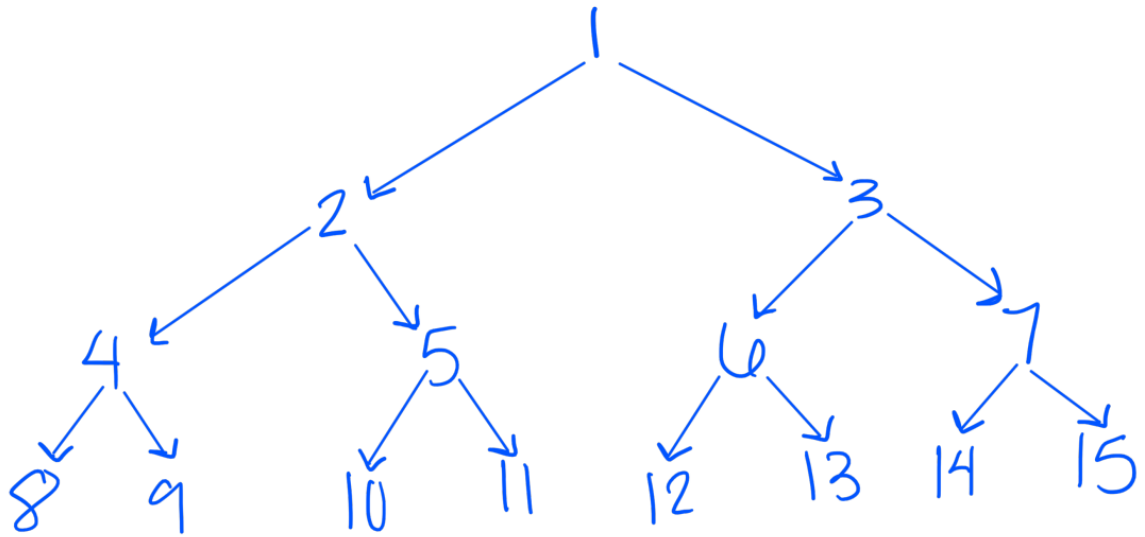
- 1.) What a representation of a 'state' is:** a monkey in a room with bananas either hanging from a ceiling or retrieved by the monkey who has either moved, sacked, and/or climbed crates
- 2.) What a reasonable initial state is:** monkey in a room with unstacked or unmoved crates and suspended bananas
- 3.) The actions you can take:** left, right, up, down direction for the boxes; boxes stacked and unstacked; monkey climbing on/ off boxes; grab bananas
- 4.) The transition model:** stacking and moving the crates making it available for the monkey to climb
- 5.) The cost function:** number of actions
- 6.) The goal test:** retrieving all the bananas from the ceiling

**C:**

- 1.) What a representation of a 'state' is:** three jugs either filled to capacity, empty, or empty with water from another jug or the faucet.
- 2.) What a reasonable initial state is:** three jugs of various sizes that don't contain water
- 3.) The actions you can take:** filling or pour out contents of a jug with either the faucet or another jug
- 4.) The transition model:** filling a jug from water source making it filled to capacity or emptying a jug filled to capacity making it empty
- 5.) The cost function:** number of actions
- 6.) The goal test:** one gallon is filled to capacity

**QUESTION 3:**

**a. Image**



- b. Suppose the goal state is 11
- i. **Breadth-first:** 1, 2, 3, 4, 5, 11
  - ii. **Depth-limited:** 1, 2, 4, 5, 11
  - iii. **Iterative deepening:** 1; 1, 2, 3; 2, 4, 5, 11
- c. Since the successor is  $(n/2)$  it helps the search focus. The branching factor is 2 forward and 1 reversed
- d. Yes, if you start at the goal state, you could use the single reverse successor until 1 is reached