HW#2 Solutions-572

3.6 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.

Solution:
Initial state: No regions colored.

Goal test: All regions colored, and no two adjacent regions have the same color.

Successor function: Assign a color to a region.

Cost function: Number of assignments.

d. You have three jugs, measuring 12 gallons, 8 gallons, and 3 gallons, and a water faucet. You can fill the jugs up or empty them out from one to another or onto the ground. You need to measure out exactly one gallon.

Solution:

Initial state: jugs have values [0, 0, 0].

Goal test: If any of the following states: [1,y,z],[x,1,z],[x,y,1]

Successor function: given values [x, y, z], generate [12, y, z], [x, 8, z], [x, y, 3] (by filling); [0, y, z], [x, 0, z], [x, y, 0] (by emptying); or for any two jugs with current values x and y pour y into x; this changes the jug with x to the minimum of x + y and the capacity of the jug, and decrements the jug with y by the amount gained by the first jug.

Cost function: Number of actions.