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CSC412

Assignment 1

3rd Edition

3.6

a)

**Initial State**: No regions colored

**Goal State**: All regions will be colored and no regions that touch will have the same color

**Actions:** Assign a color to a region

**Path Cost**: Number of assignments

b)

**Initial State**: A 3-foot-tall monkey is in a room with bananas suspended just below the ceiling. The room has two stackable, movable and climbable 3-foot high crates. The monkey wants the bananas.

**Goal State:** The monkey gets the bananas

**Actions:**

1. Stack a crate on another
2. Move a crate
3. Climb on a crate
4. Walk from one spot to another spot
5. Grab Bananas
6. Get off crate

**Path Cost:** Number of actions performed

c)

**Initial State:** Program to output “illegal input record proceeding” on each record

**Goal State:** Find out which record is illegal

**Actions:**

1. Run all records
2. Run again on the first half of records
3. Run again on the second half of records

**Path Cost:** Number of runs

d)

**Initial State:** Jugs have value [0,0,0]

**Goal State:** Measure exactly one gallon

**Actions:**

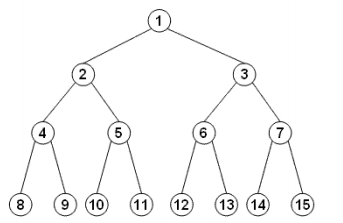
Consider 12-gallon, 8-gallon, and 3-gallon jug

1. Fill 12-gallon jug with water
2. Pour water from 12-gallon jug to 8-gallon jug until the 8-gallon is full
3. 12-gallon jug now contains 4-gallons (12-8)
4. Pour what’s left in the 12-gallon jug into the 3-gallon jug until the 3-gallon is full
5. 1 gallon is left after you fill the 3-gallon jug

**Path Cost:** Number of actions performed

3.15

a)



b) BFS: 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 10 → 11.

DFS: 1 → 2 → 4 → 8 → 9 → 5 → 10 → 11.

IDS: 1; 1 → 2 → 3; 1 → 2 → 4 → 5 → 3 → 6 → 7; 1 → 2 → 4 → 8 → 9 → 5 → 10 → 11.

c) Bidirectional search would work well because the only successor of k in the reverse direction is k/2

1 – Forward – {2,3}

11 – Backward – {5}

2 – Forward – {3,4,5}

5 – Backward – {2}

d) Reformulation for moving forward – 2

Reformulation for moving backward – 1

e) If the action is going from k to 2k left and 2k+1 right, the simple algorithm is to perform a single reverse successor search until the goal is reached. No branching necessary.