Midterm Test 1

Artificial Intelligence

Name :- PALASH BAJPAI

Batch :- A

ROLL NO :- B180759CS

1) a. Internet book-shopping agent

Performance Measure :- Book rating , price

Environment :- web

Actuators :- url and links , display books in web apps

Sensors :- HTML pages

Environment characterstics

1) Partially observable
2) Deterministic : Partly
3) Sequential
4) Static : Semi
5) Discrete
6) Multi-agent

b. Performing a high-jump

Performance measure :- height of jump

Environment :- high jump field / track

Actuatorss :- bar and jump mat

Sensor :- camera and height measuring instruments

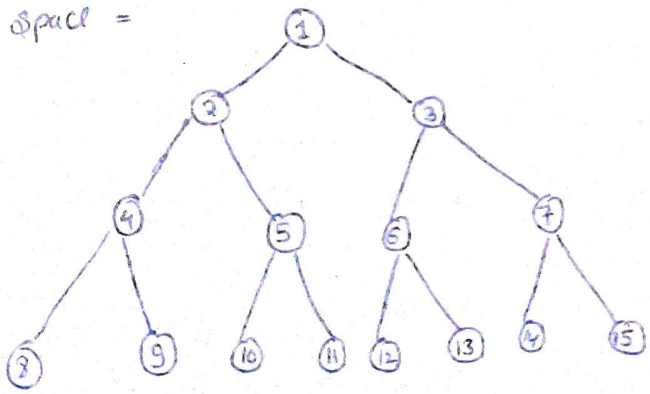
Environment characteristics :-

1) Observable
2) Deterministic
3) Episodic
4) Static
5) Discrete
6) Single - agent

2) a) False.
eg Vaccum cleaning agent is rational but does not observe state of square that is adjacent to it.

b) True
Since pure reflex agent ignores previous percepts, so can not obtain optimal state estimate in partially observable environment. Eg Card game concentration where reflex agent fails due to memory requirements

3) a) State space =



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

DLS (Limit 3) :- 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.

4) States :- any arrangement of 4 colors on planar map.

initial state :- uncolored map

actions :- color the uncolored regions with one of the four color

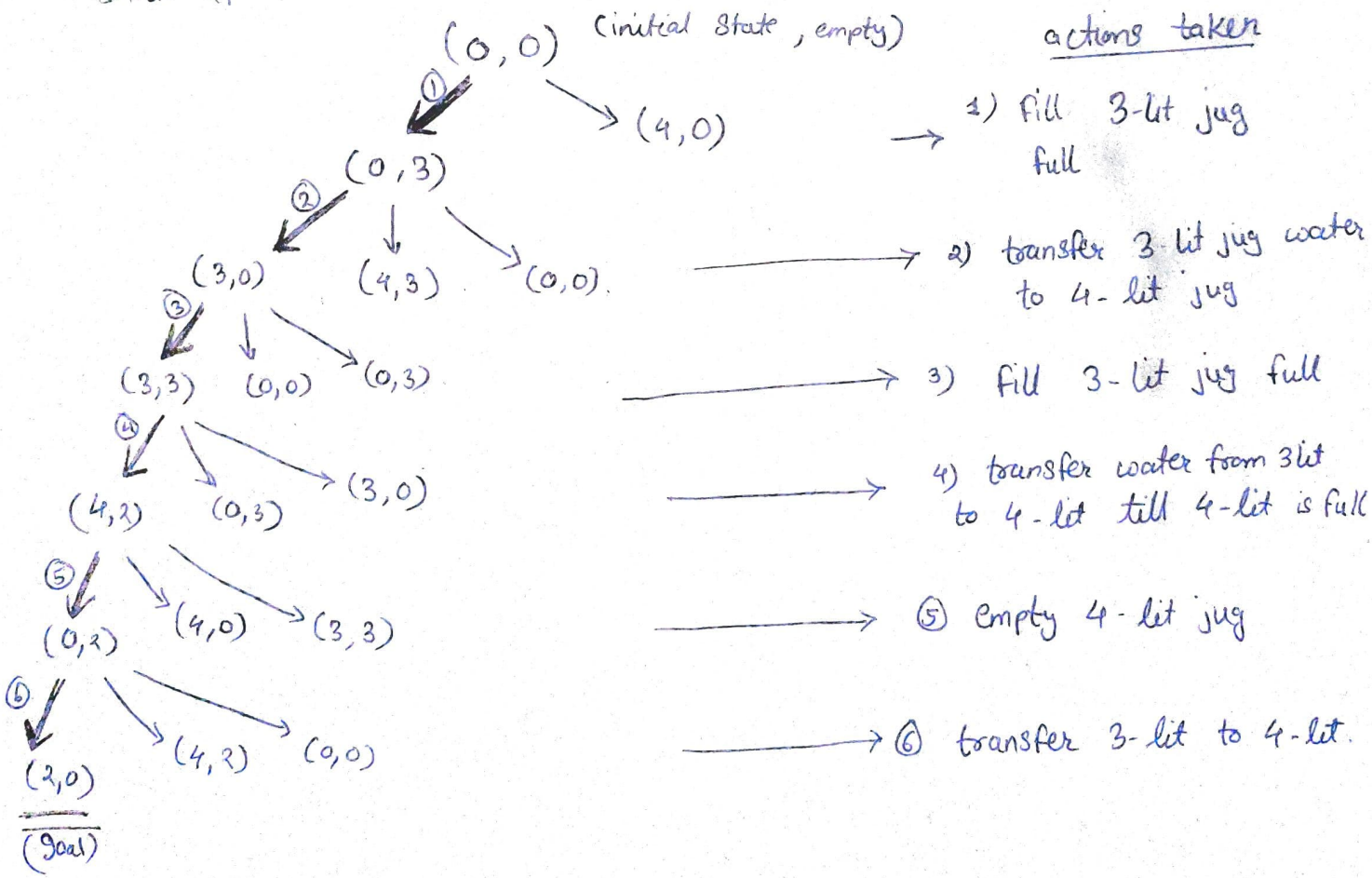
goal test :- Fully colored map with no adjacent regions of same color.

path cost :- 1 per action (coloring)

5) consider X = water in 4 litre jug
Y = water in 3 litre jug

our states are represented as (x, y)

State space :-



6) True

Since complete means to find goal when exists and thus it is independent of step costs

7) Consider a tree with 1 child for each node. Let it have n levels

DFS = n steps

IDS = $1 + 2 + 3 + \cdots + n$

$= n(n+1)/2 = O(n^2)$

So here IDS performs much worse than dfs.

8) a) for completeness $\Rightarrow \omega \leq 1$.

b) for optimal $\Rightarrow 0 \leq \omega \leq 1$.

c) for $\omega = 0$ → Uninformed best-first search

$\omega = 1$ → A* search

$\omega = 2$ → Greedy best-first search

9) a) farmer, cabbage, goat, wolf

assume go west to east

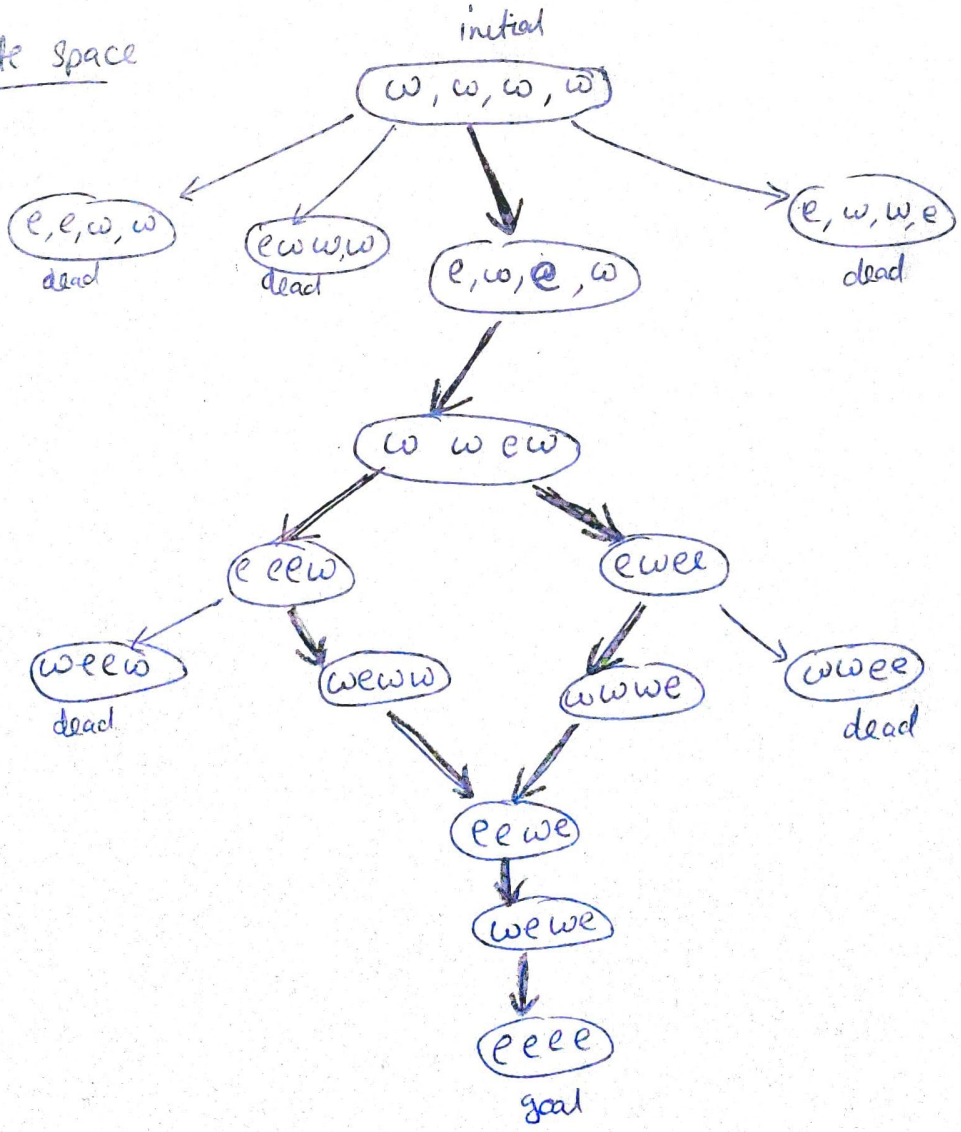
State = (<side for farmer>, <side for wolf>, <side for goat>, <side for cabbage>)

Initial = (w, w, w, w) all in west

final (goal) = (e, e, e, e) All at east bank

dead State = (e, w, w, e) – wolf eats goat
(w, e, e, w) – wolf eats goat
(e, e, w, w) – goat eats cabbage
(w, w, e, e) – goat eats cabbage

State Space



b) State (w w w w)

↓

State (e w e w)

↓

(w w e w)

↓

(e w e e)

↓

(w w w e)

↓

(e e w e)

↓

(w e w e)

↓

(e, e, e, e)