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ECE-469
HW 1

1 a) Go

i) fully observable

ii) strategic

iii) sequential

iv) semi-dynamic

v) discrete

vi) multi-agent

vii) entire percept history

b) Tenga

i) partially observable

ii) deterministic

iii) sequential

iv) semi-dynamic

v) continuous

vi) single-agent

vii) current percept

c) Face recognition

i) fully observable

ii) deterministic

iii) episodic

iv) semi-dynamic

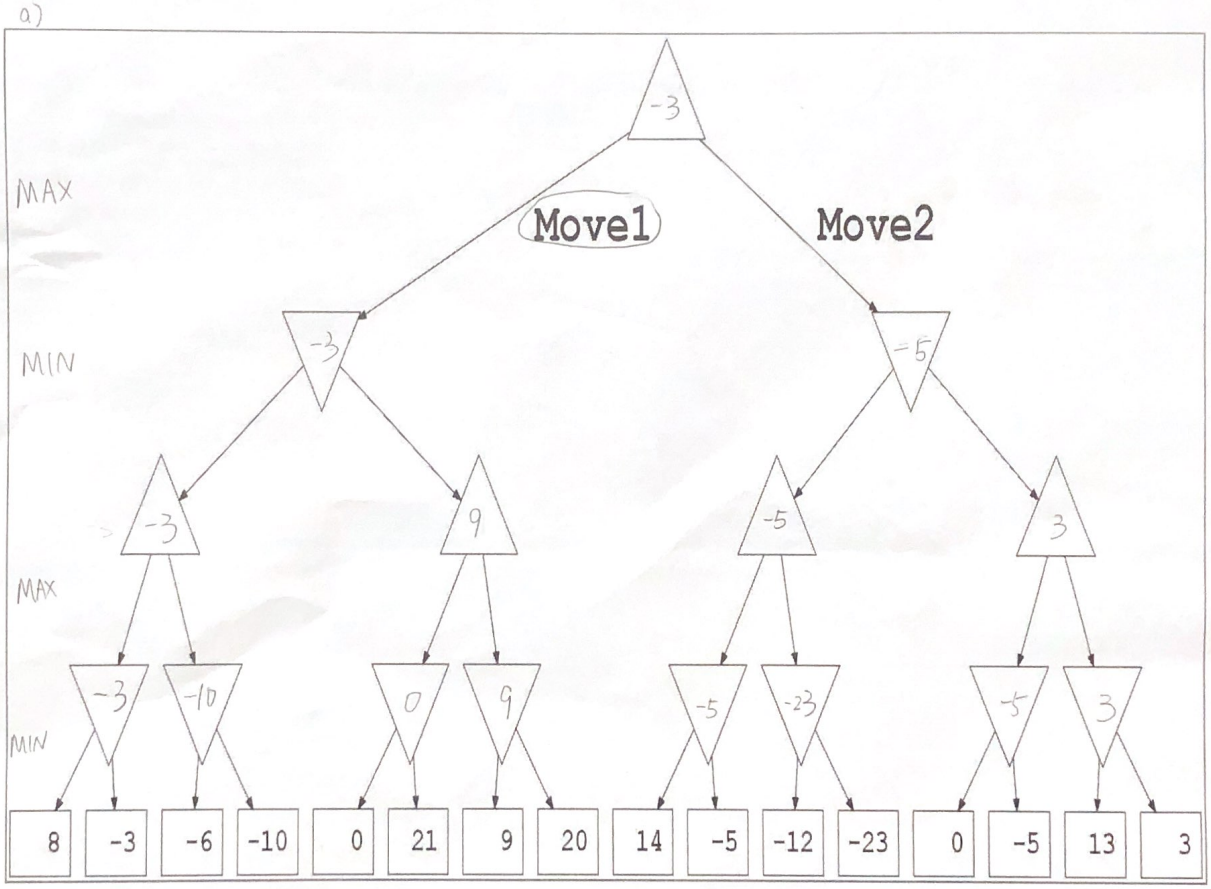
v) continuous

vi) single agent

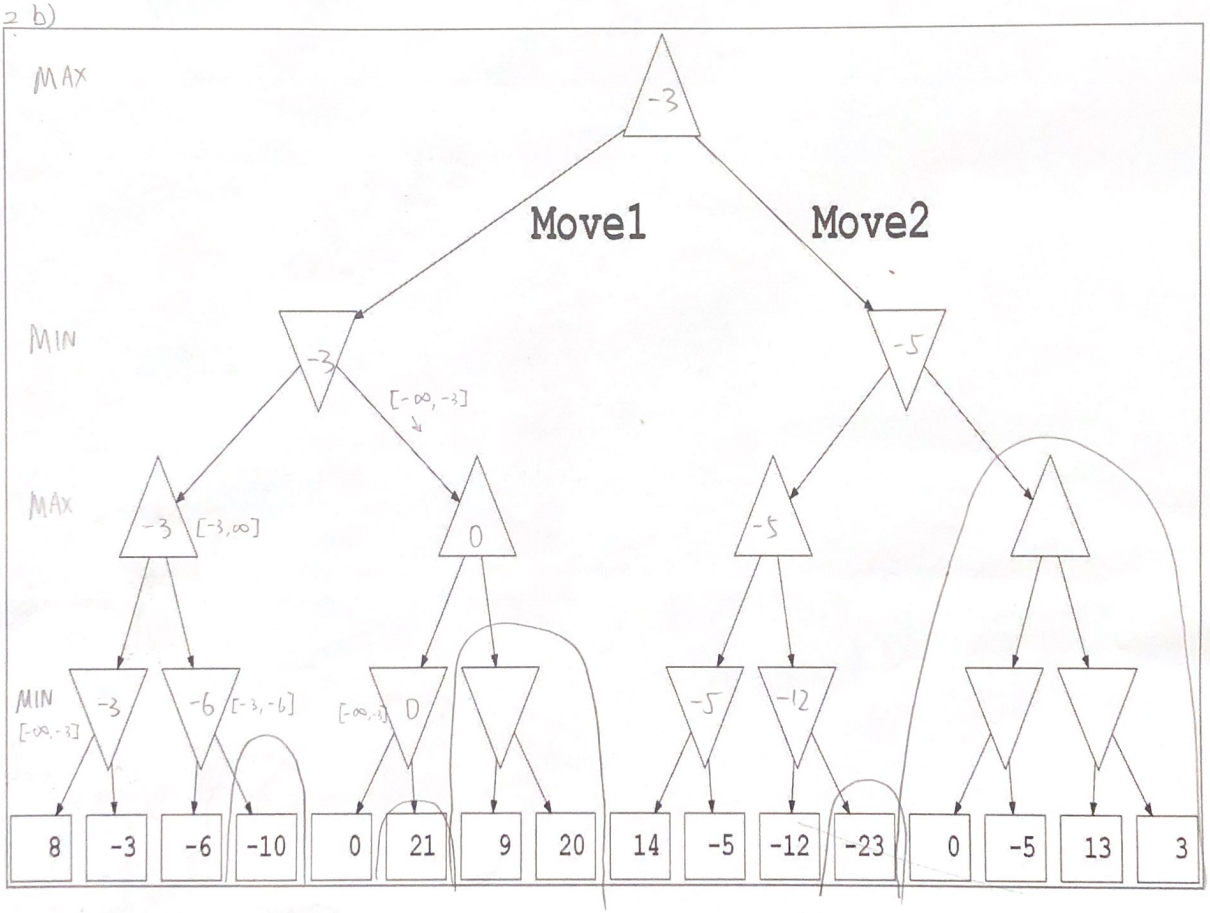
vii) entire percept history

ECE 469: Artificial Intelligence
Fall 2020
Problem Set #1

2 a)

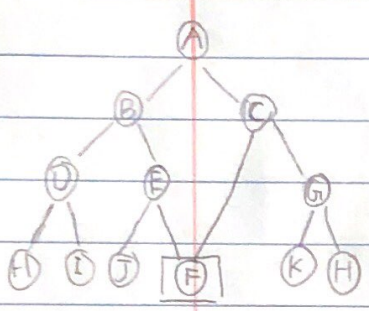


2 b)


MAX
-3
Move1
Move2
MIN
-3
[-∞, -3]
-5
MAX
-3
[-3, ∞]
0
-5
MIN
[-∞, -3]
-3
-6
[-3, -6]
[-∞, -3]
0
-5
-12
8
-3
-6
-10
0
21
9
20
14
-5
-12
-23
0
-5
13
3

2 c) If both player plays perfectly, MIN will win the game. Because the minimax value is negative, which means if both players play the game perfectly, MIN will always win the game.

3. a) DFS is complete but not optimal. Because the maze is of size $N \times M$ — finite space, and by remembering nodes on the current path, we can avoid cycles. Therefore DFS is able to perform a complete search.



If a case on the left occurs where A is the enterance and F is the exit, DFS will find A-B-E-F as solution, rather A-C-F which is the optimal solution.

b) BFS is complete and optimal. Because there is a finite branching factor, BFS can perform a complete search. Since the path cost is constant (a non-decreasing function of depth), DFS is optimal.

c) H_1, H_2, H_3 would guarantee that the graph search version of A^* search is optimal. It is optimal with a ADMISSIBLE HEURISTIC as long as repeated paths to a state with better costs are not discarded. The shortest (most ideal) path from (x,y) to (N,M) is $N-x+M-y$ (H_2). $H_1 = 0 < H_2$ $H_3 = \sqrt{(N-x)^2+(M-y)^2} < H_2$ by Pythagorean Theorem. $H_4 = (N-x) \times (M-y) > H_2$ $(N \geq x, M \geq y, x, y, M, N$ are all positive integers).

d) $H_1(n) = N - x + M - y$ is the best one to use with the graph search version of A^*, because without overestimating, H_2 is the largest (out of H_1, H_2, H_3).