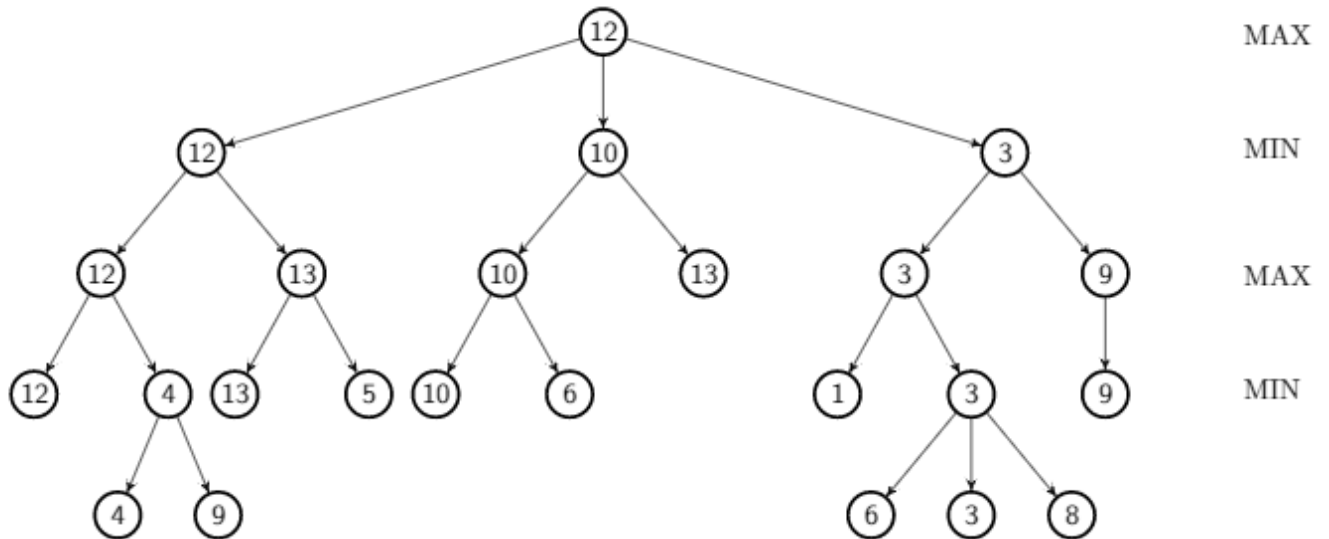


Problem 1. Minimax and Alpha-Beta

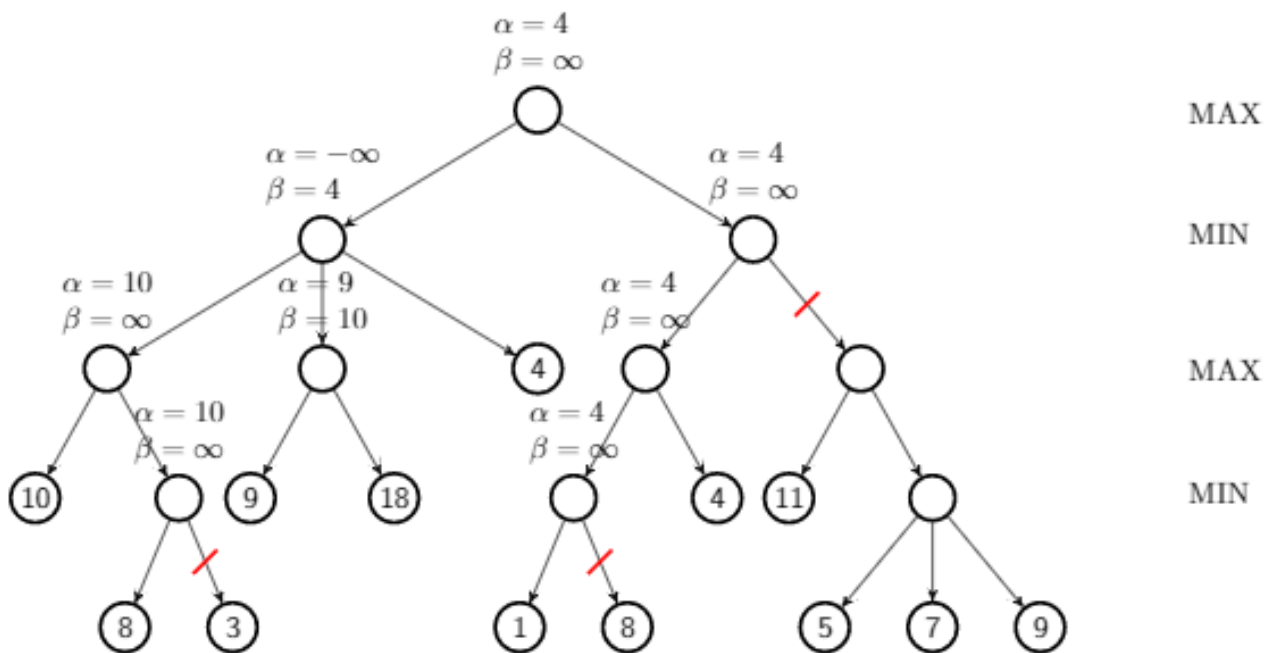
a) Minimax – 5 points in total



[1] for having the correct value at the root node

[-0.5] for each incorrect value at the inner nodes (deduct a maximum of 4 points)

b) Alpha-Beta Pruning – 7 points in total



[2] for having the correct alpha and beta values at the root node

- [1] for the alpha value
- [1] for the beta value

[3] for having the correct alpha and beta values at the inner nodes right before the pruned nodes (3 of them in total)

- [0.5] for each of the alpha values
- [0.5] for each of the beta values

[2] for having the correct alpha and beta values at the other inner nodes (4 of them in total)

- [0.25] for each of the alpha values
- [0.25] for each of the beta values

c) No, Alpha-beta pruning only speeds up Minimax algorithm, it doesn't change any move.

3 points in total

[1] for saying "No"

[2] for the correct reason

Problem 2. Hill Climbing

a) n neighboring states – **2 points**

[2] for correct answer

b) Each variable can take two values, and there are n variables. So there are 2^n possible states. - 3 points

[3] for correct answer

c) **Iteration 1:**

Initial State :

A=F, B=F, C=F, D=F, E=F ; Score: 2

Successor States:

A=T, B=F, C=F, D=F, E=F ; Score: 3

A=F, B=T, C=F, D=F, E=F ; Score: 4

A=F, B=F, C=T, D=F, E=F ; Score: 3

A=F, B=F, C=F, D=T, E=F ; Score: 3

A=F, B=F, C=F, D=F, E=T ; Score: 3

We choose state A=F, B=T, C=F, D=F, E=F

Iteration 2:

Initial State :

A=F, B=T, C=F, D=F, E=F ; Score: 4

Successor States:

A=T, B=T, C=F, D=F, E=F ; Score: 4

A=F, B=T, C=T, D=F, E=F ; Score: 4

A=F, B=T, C=F, D=T, E=F ; Score: 6

A=F, B=T, C=F, D=F, E=T ; Score: 5

A=F, B=F, C=F, D=F, E=F ; Score: 2

We choose state A=F, B=T, C=F, D=T, E=F . As score = max score (6) we will stop.

Yes we will get a optimal solution with Hill climbing as we were able to get Max score of 6 with above chosen state.

[5] for each iteration, total 10 points,

[0.5] for correct successor state and [0.5] for correct score of that successor state. Hence, for 5 successors total score of iteration is [5]

d) initial state is: A=F, B=F, C=F; Score = 3

This state is at a plateau because all of its successors are at the same score.

Successor States:

A=T, B=F, C=F; Score: 3

A=F, B=T, C=F; Score: 3

A=F, B=F, C=T; Score: 3

Total [5] points

[0.5] for correct successor state and [0.5] for correct score of that successor state. Hence total [4] points for four states.

[1] for stating the correct reason (i.e. all of them have same score).