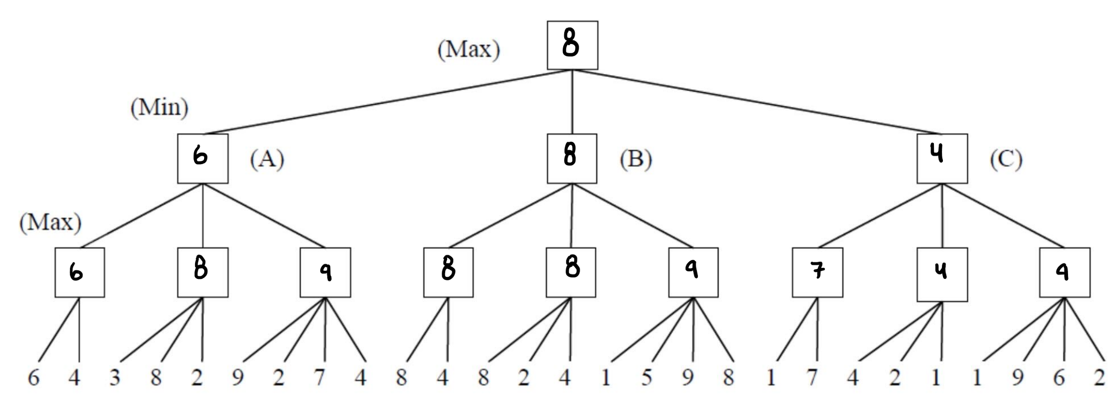
Lab #3

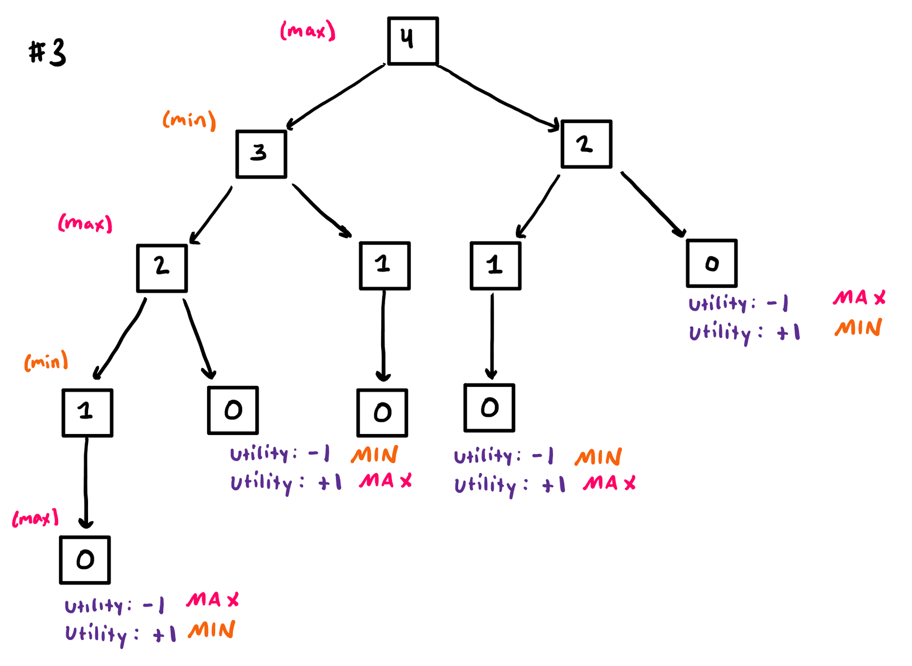
Thursday, April 11, 2024 12:58 PM

#1

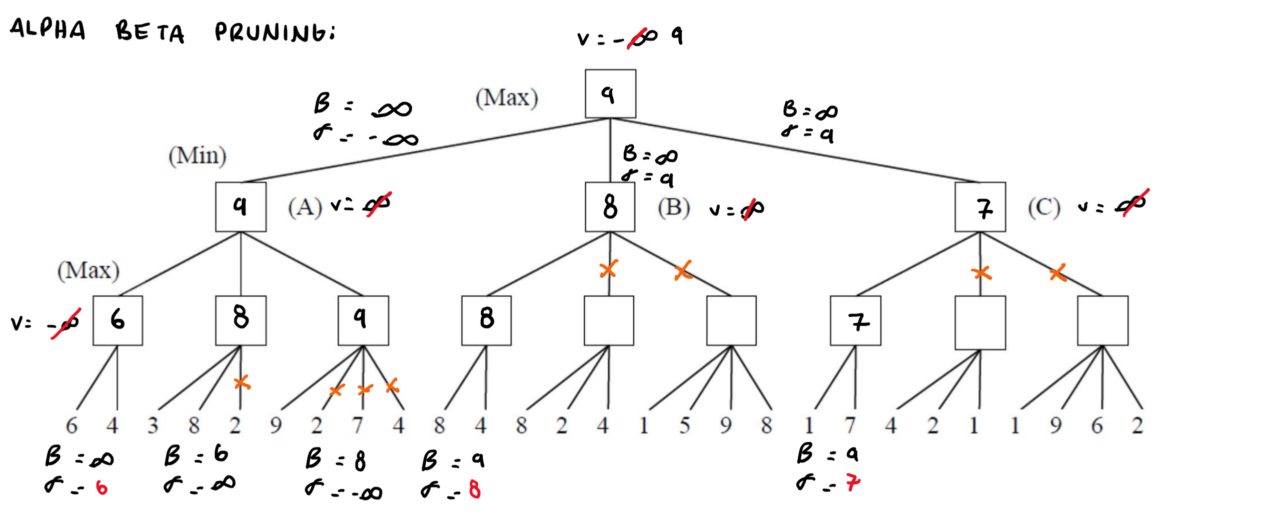


#2 The best move for MAX would be path B because it provides higher options

#3



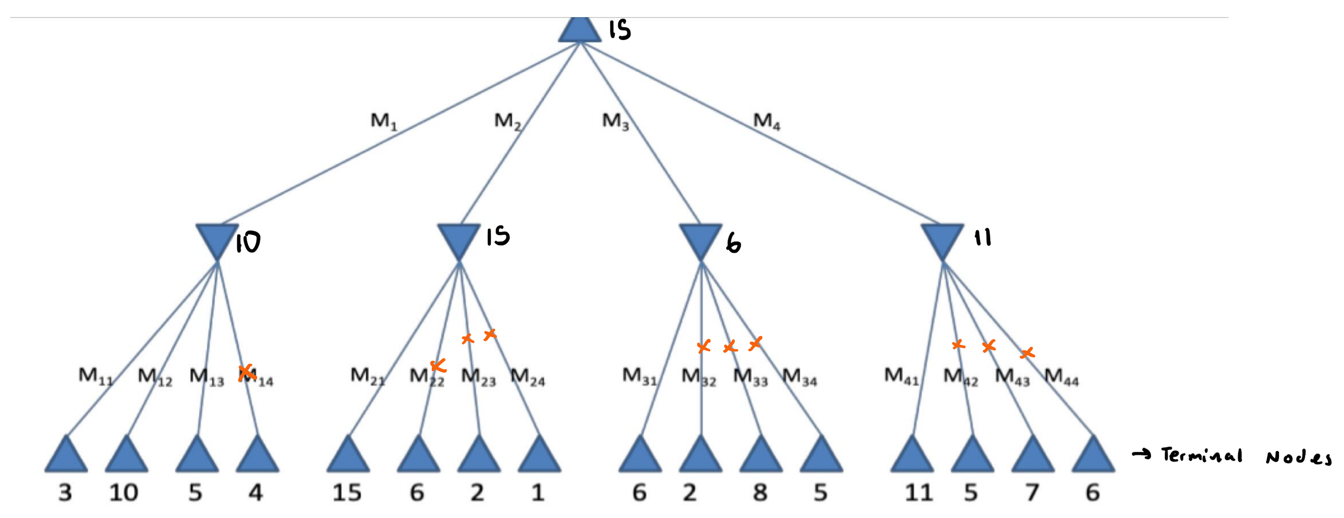
#4 ALPHA BETA PRUNING:



general configuration: $\alpha \geq \beta$ w/ MAX → α MIN → β

Note:
- α Alpha - best already explored option along path to the root for maximizer
- β Beta - best already explored option along path to the root for minimizer

#5



a) Write down the minimax value of every non-terminal node next to that node.

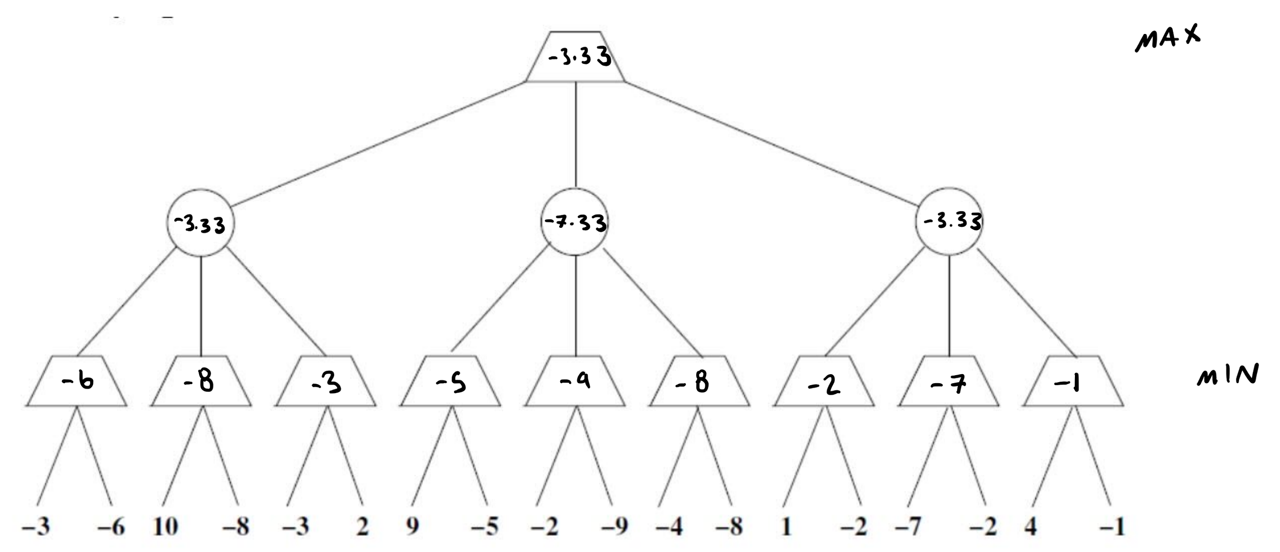
b) How will the game proceed, assuming both players play optimally? w/ the MAX player choosing M2 (15), and MAX choosing 1

c) Cross out the branches that do not need to be examined by alpha-beta search in order to find the minimax value of the top node, assuming that moves are considered in the non-optimal order shown.

d) Suppose that a heuristic was available that could re-order the moves of both max (M_1, M_2, M_3, M_4) and min (M_{11}; … ;M_{44}) in order to force the alpha-beta algorithm to prune as many nodes as possible. Which max move would be considered first: M_1, M_2, M_3, or M_4? Which of the min moves (M_{11}, . . . M_{44}) would have to be considered?

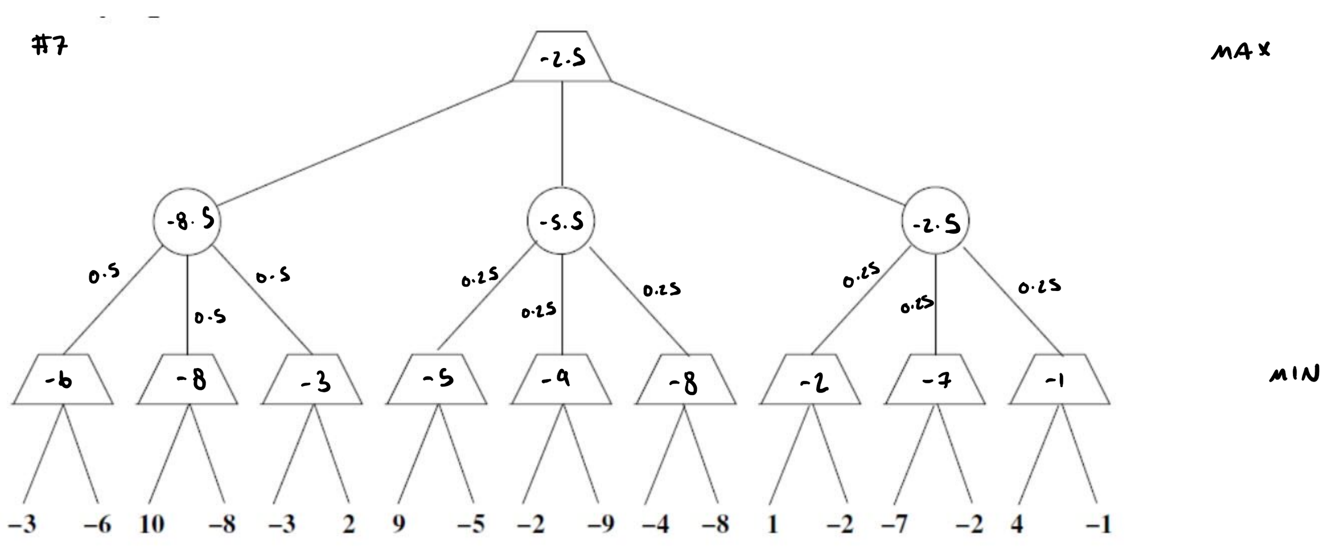
The max move to be concidered first: M_2 (to get 15)
The min move to be concidered first: M_{24} (to get 1)

#6 chance Node:



= (-6 + -8 + -3)/3 → -3.33
= (-5 + -9 + -8)/3 → -7.33
= (-2 + -7 + -1)/3 → -3.3

#7



= (0.5 × -6) + (0.5 × -8) + (0.5 × -3) = -8.5
= (0.25 × -5) + (0.25 × -9) + (0.25 × -8) = -5.5
= (0.25 × -2) + (0.25 × -7) + (0.25 × -1) = -2.5

Practice w/ Expected Value

#1

Probability of Heart: 13/52 → 1/4 winning 10$
Probability of Non-Heart Face Card: 9/52 winning 8$
Probability of Any othe card: 30/52 lose 6$

= (1/4 × 10) + (9/52 × 8) + (30/52 × 6)
= 0.42

Sine the expected value > 0, I would play!

#2 Probability of rolling a 1: 1/6 winning $25
Probability of rolling a 2: 1/6 winning $5
Probability of rolling a 4/5: 1/3 loss $10
Probability of rolling a 6: 1/6 loss $15

= (1/6 × 25) + (1/6 × 5) + (1/3 × -10) + (1/6 × -15)
= -0.83

Um no thank you, according the question (which is questionably stated).. Señor Rick's game is loca and I would not play.

#3 Probability of a red ball: 5/12 winning $14
Probability of a yellow ball: 4/12 winning $12
Probability of a green ball: 3/12 loss $10

= (5/12 × 14) + (4/12 × 12) + (3/12 × -10) × 100
= $723 if I play 100 times (woo!)

#4 Probability of 1st: 1/20 winning $4,500
Probability of 2nd: 1/10 winning $3,500
Probability of 3rd: 1/4 winning $1,500
Probability of outside top: 1 - (1/20 + 1/10 + 1/4) → 0.525 loss 1,000

= (1/20 × 4,500) + (1/10 × 3,500) + (1/4 × 1,500) + (0.25 × -1,000)
= $425

YES, it is so worthwile to enter the race if it costs $1,000

#5 Probibility of losing = 0.35
Probability of winning = 0.25
Probability of even = 0.4

= (0.35 × -30,000) + (0.25 × 55,000) + (0.4 × 0)
= $3,250

With this information you should investing in the project

#6 Probability of sucess = 3/4

= (3/4 × 120,000) + (1/4 × 98,000)
= $65,500

Yes, you should proceed with the plans :)

#7 Total packages = 52

$$\left.\begin{array}{l} \hookrightarrow 12 \times 0.80 = 9.60 \\ \hookrightarrow 15 \times 0.40 = 6.00 \\ \hookrightarrow 25 \times 0.30 = 7.50 \end{array}\right\} = \$23.10 / 52 = 0.444$$

Since $0.\overline{4} < 0.5$ it's not worthwhile!