

ALPHA - BETA PRUNING



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ALPHA - BETA PRUNING



Alpha - Beta Pruning

- Avoid processing those sub-trees that have *no effect* on the result.
- Two new parameters
 - α : The best value for MAX seen so far
 - β : The best value for MIN seen so far

Alpha - Beta Pruning

- α is used in MIN nodes, and is assigned in MAX nodes.
- β is used in MAX nodes, and is assigned in MIN nodes.
- **When maximizing:**
 - cut off values lower than Alpha
- **When minimizing:**
 - cut off values greater than Beta

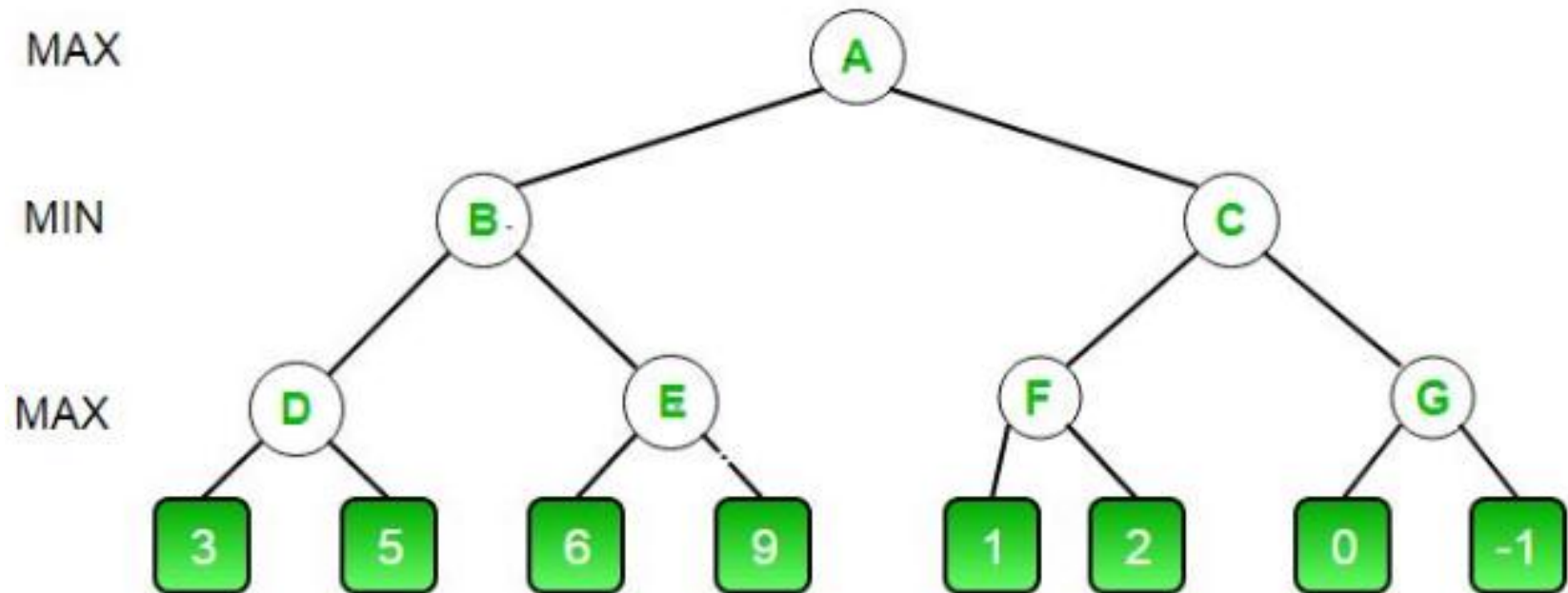
When to Prune

- *Prune whenever $\alpha \geq \beta$*
- Prune below a Max node whose alpha value becomes \geq the beta value of its ancestors.
 - *Max nodes update alpha based on children's returned values.*
- Prune below a Min node whose beta value becomes \leq the alpha value of its ancestors.
 - *Min nodes update beta based on children's returned values.*

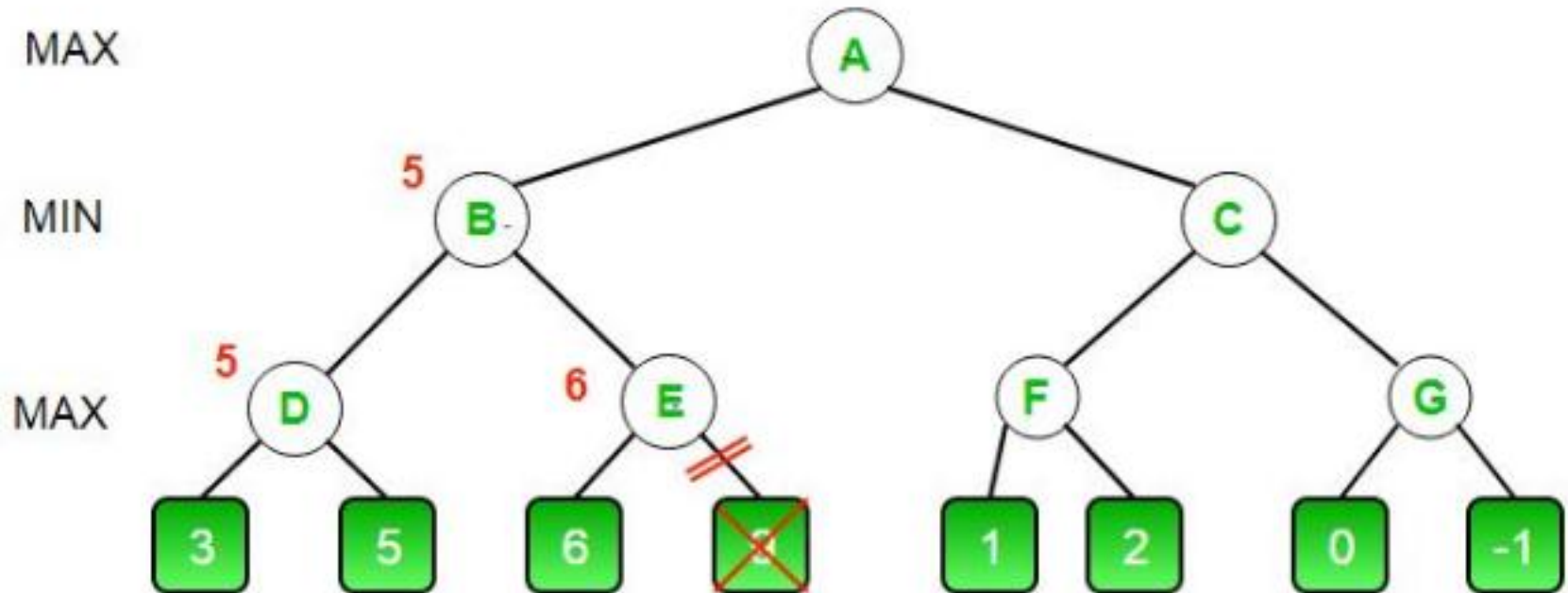
ALPHA - BETA PRUNING

Example 1

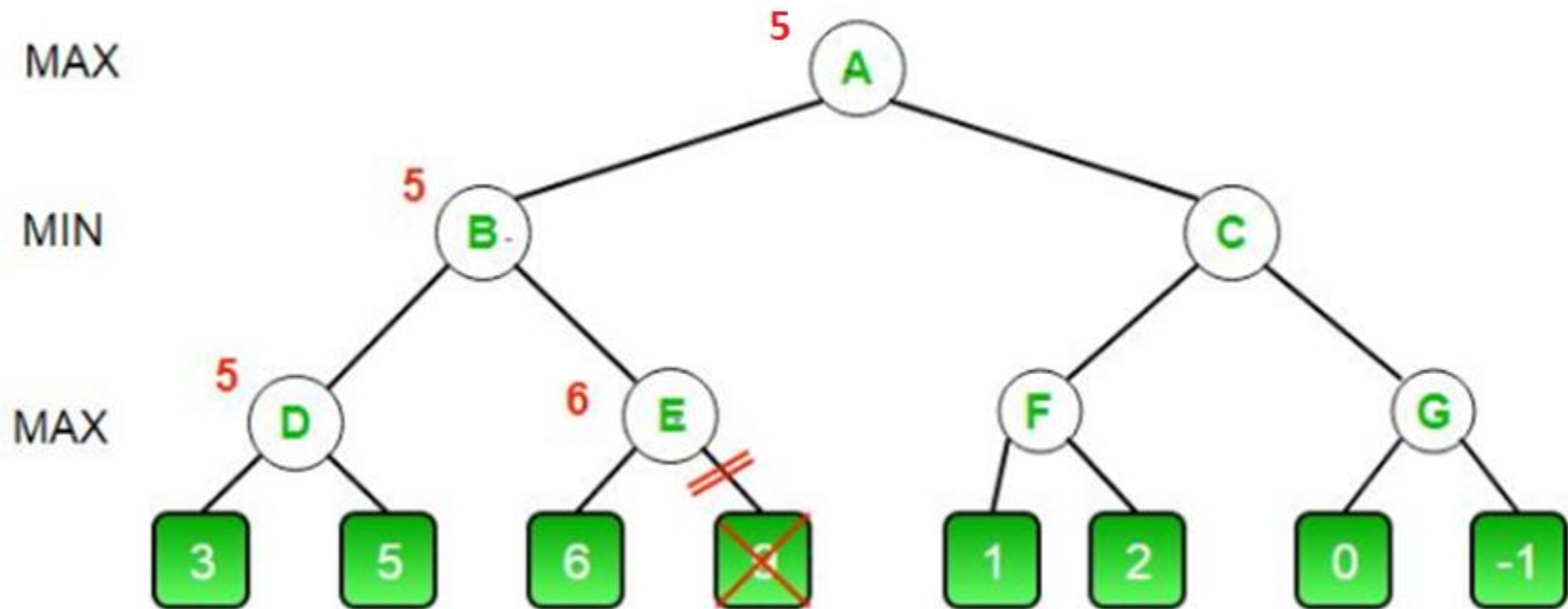
Example 1



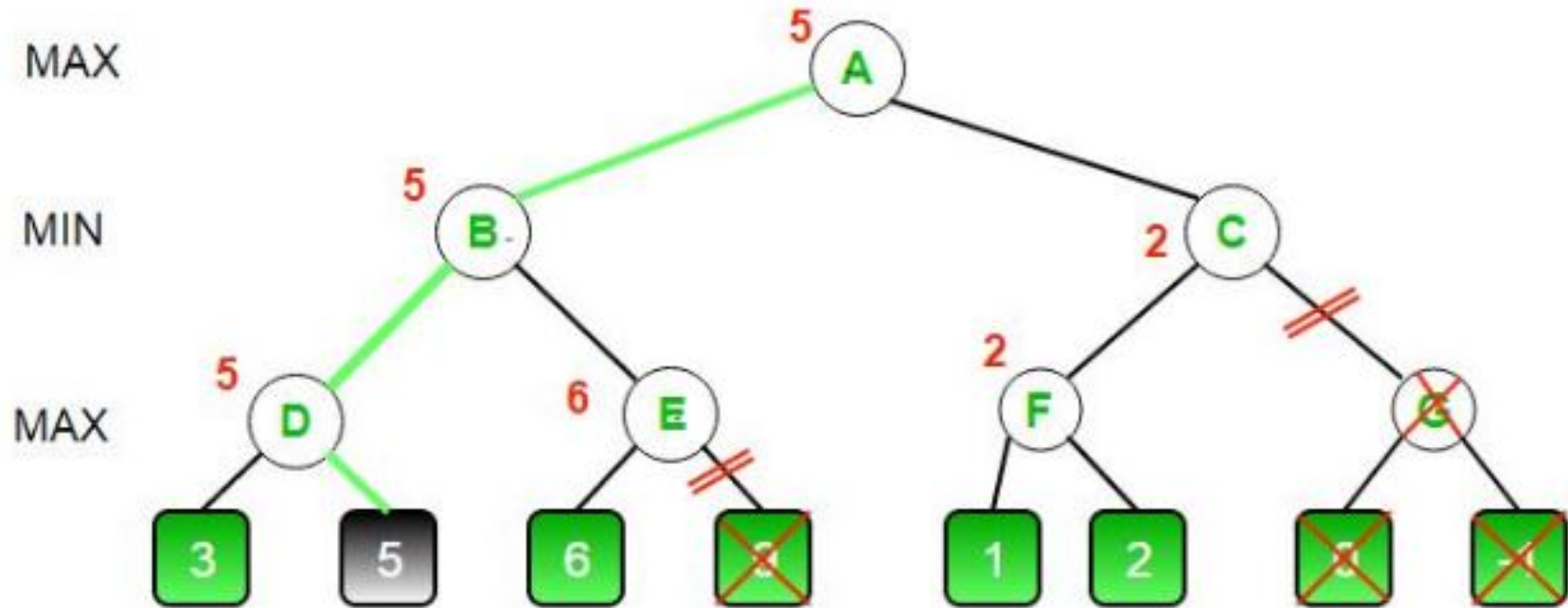
Example 1



Example 1



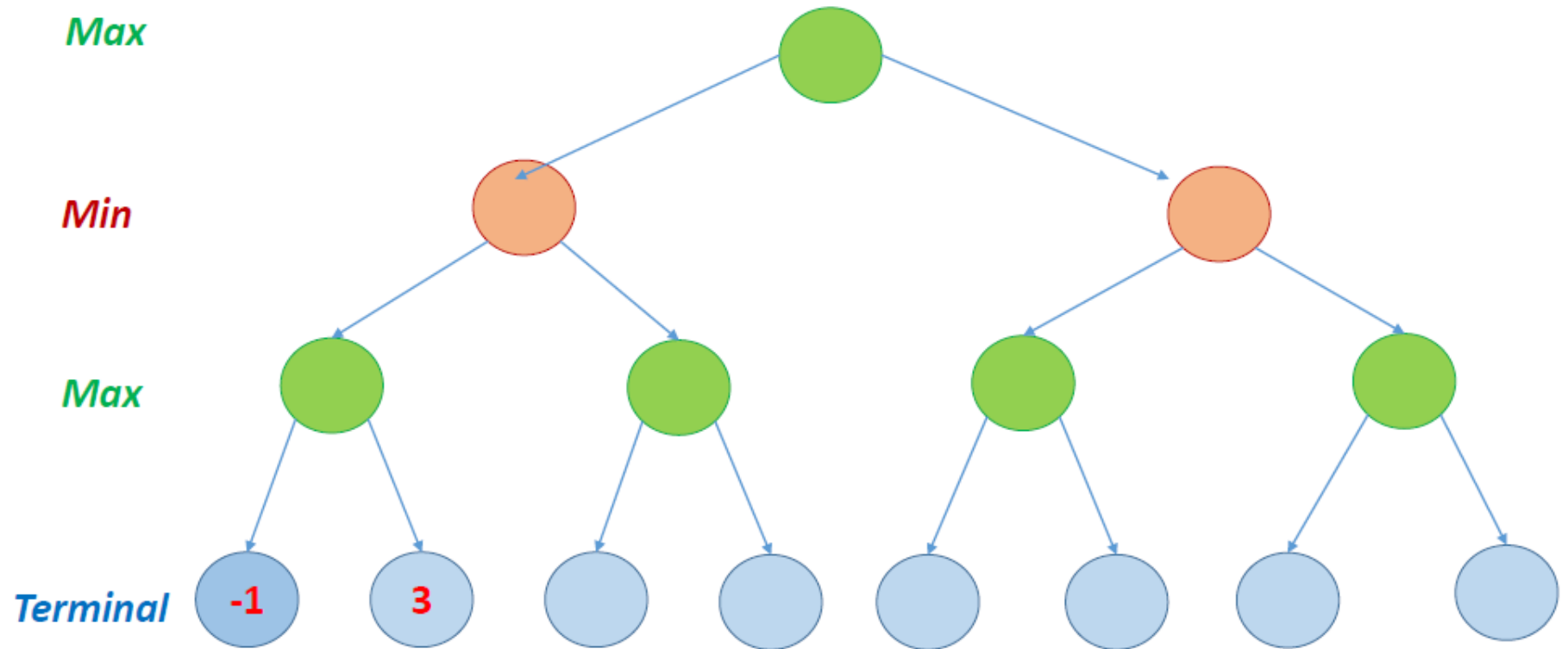
Example 1



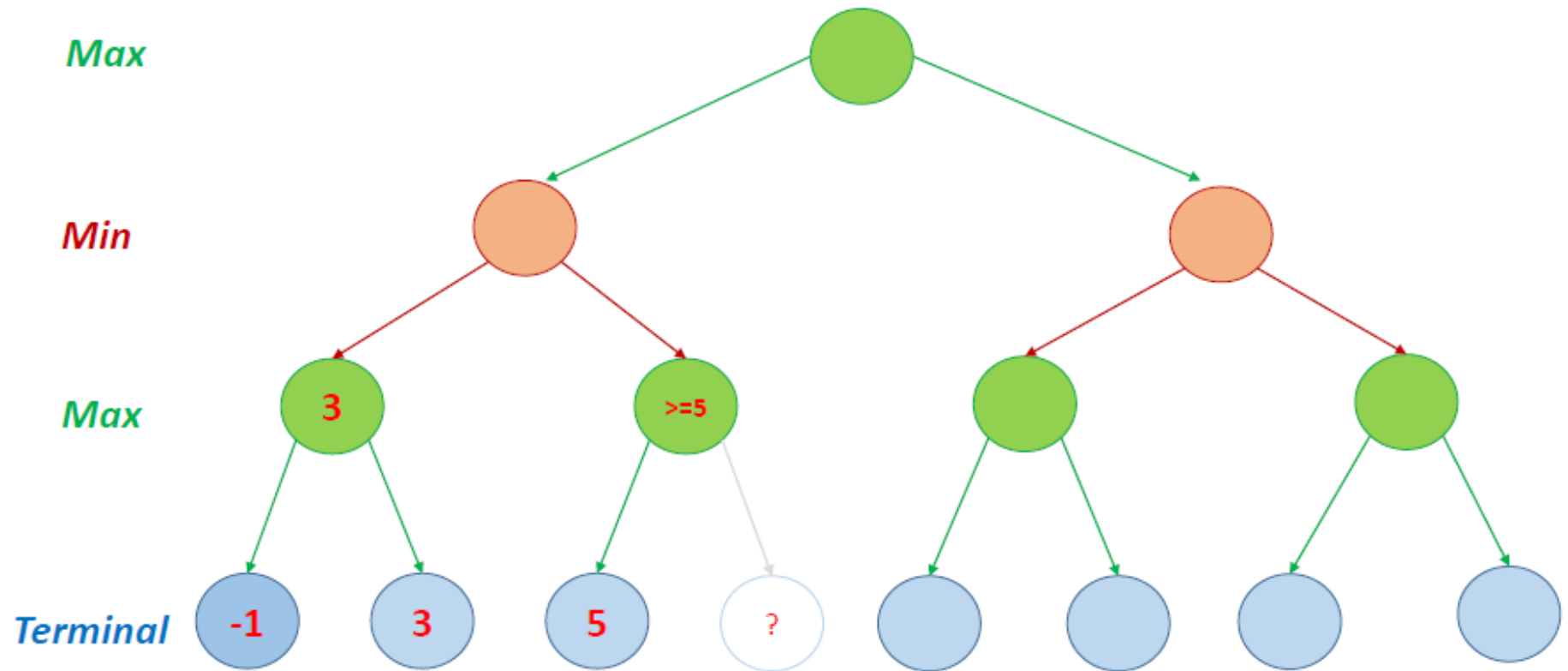
ALPHA - BETA PRUNING

Example 2

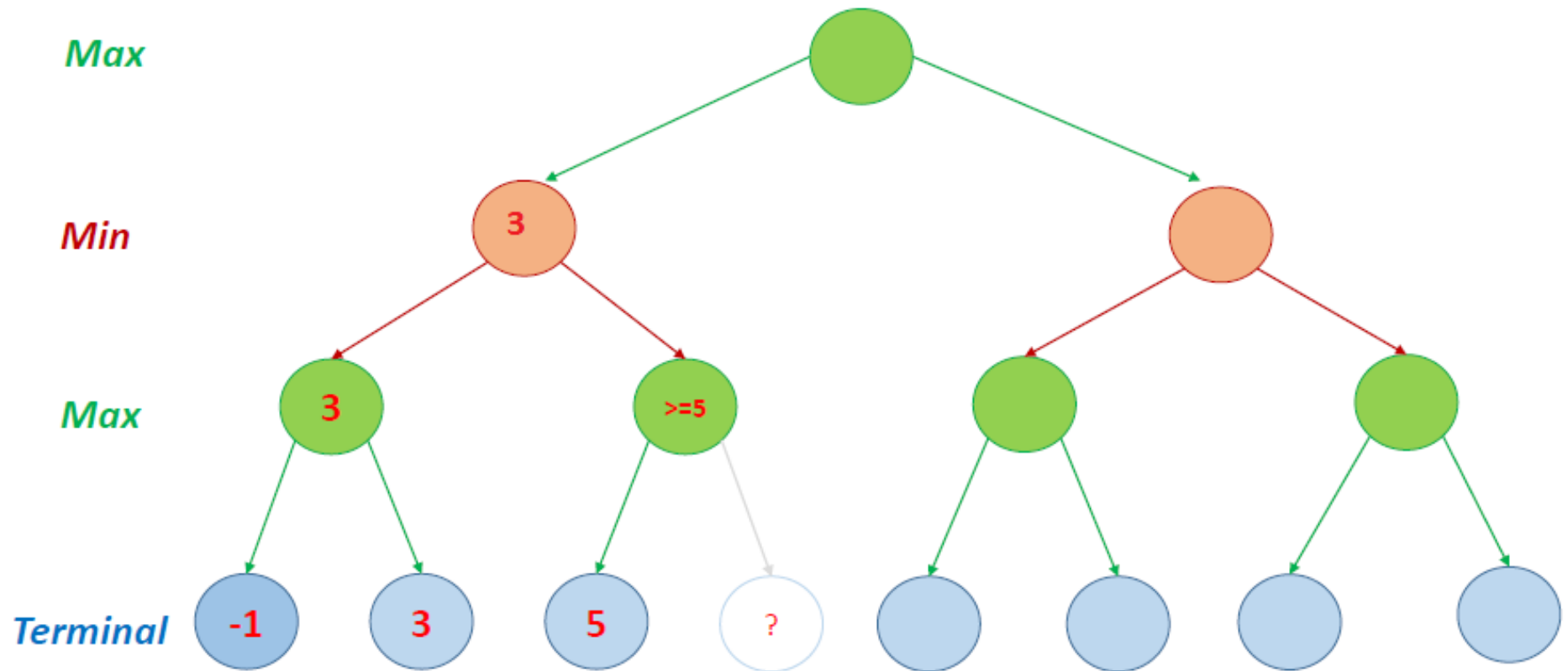
Example 2



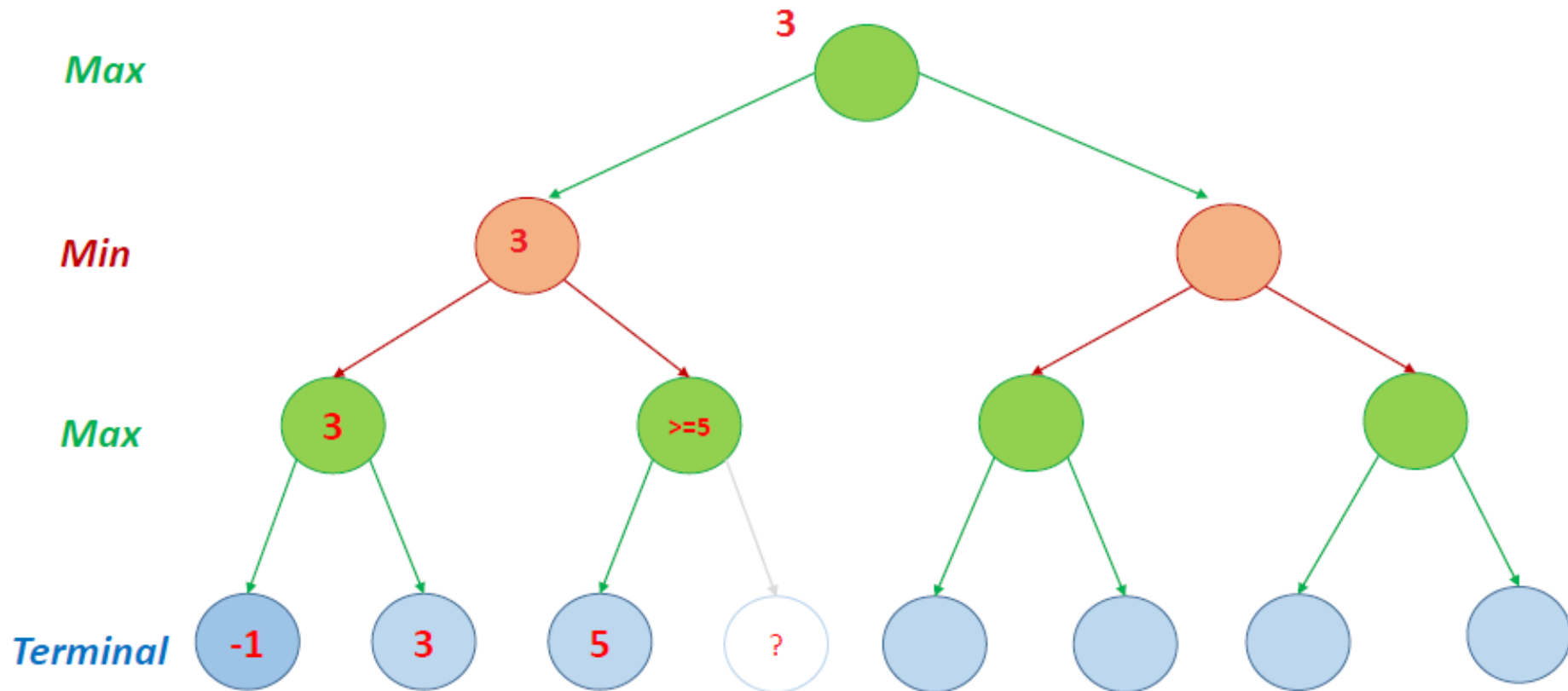
Example 2



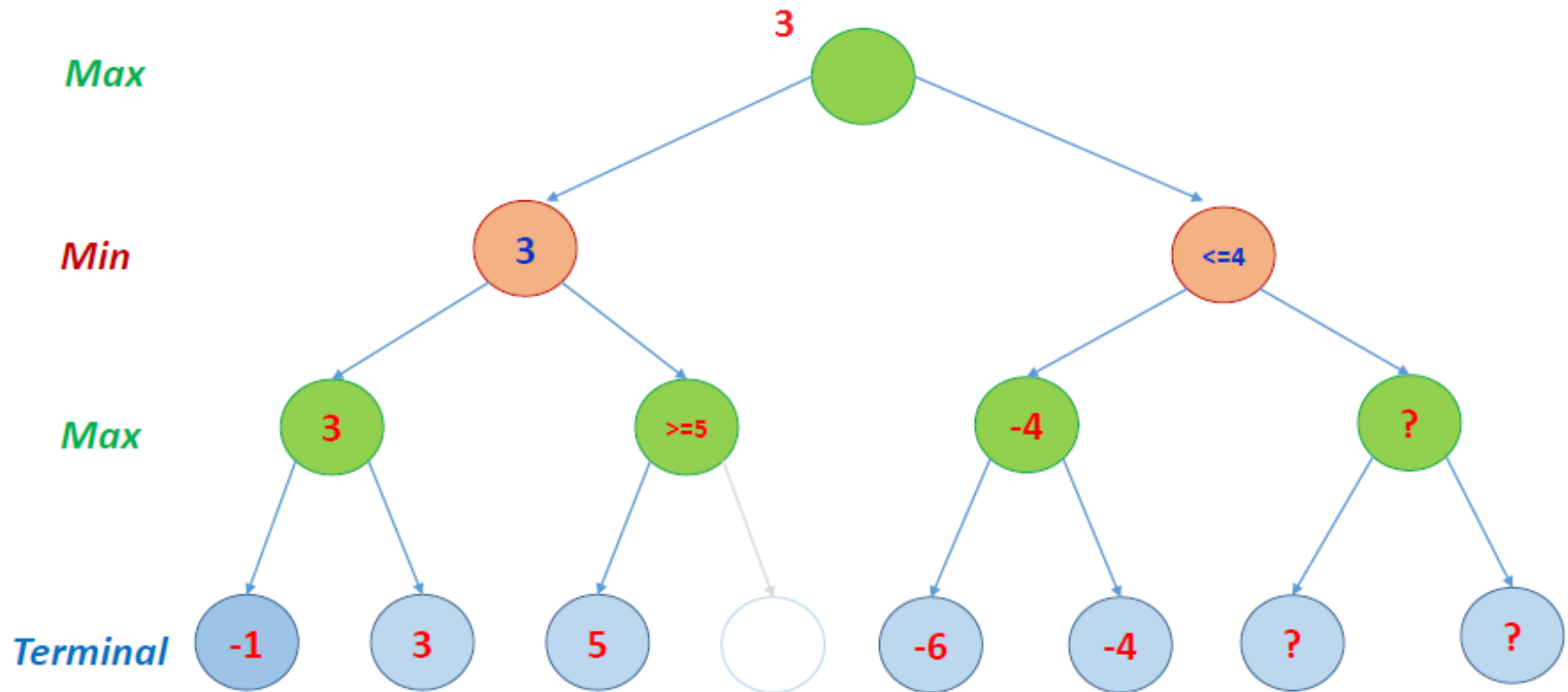
Example 2



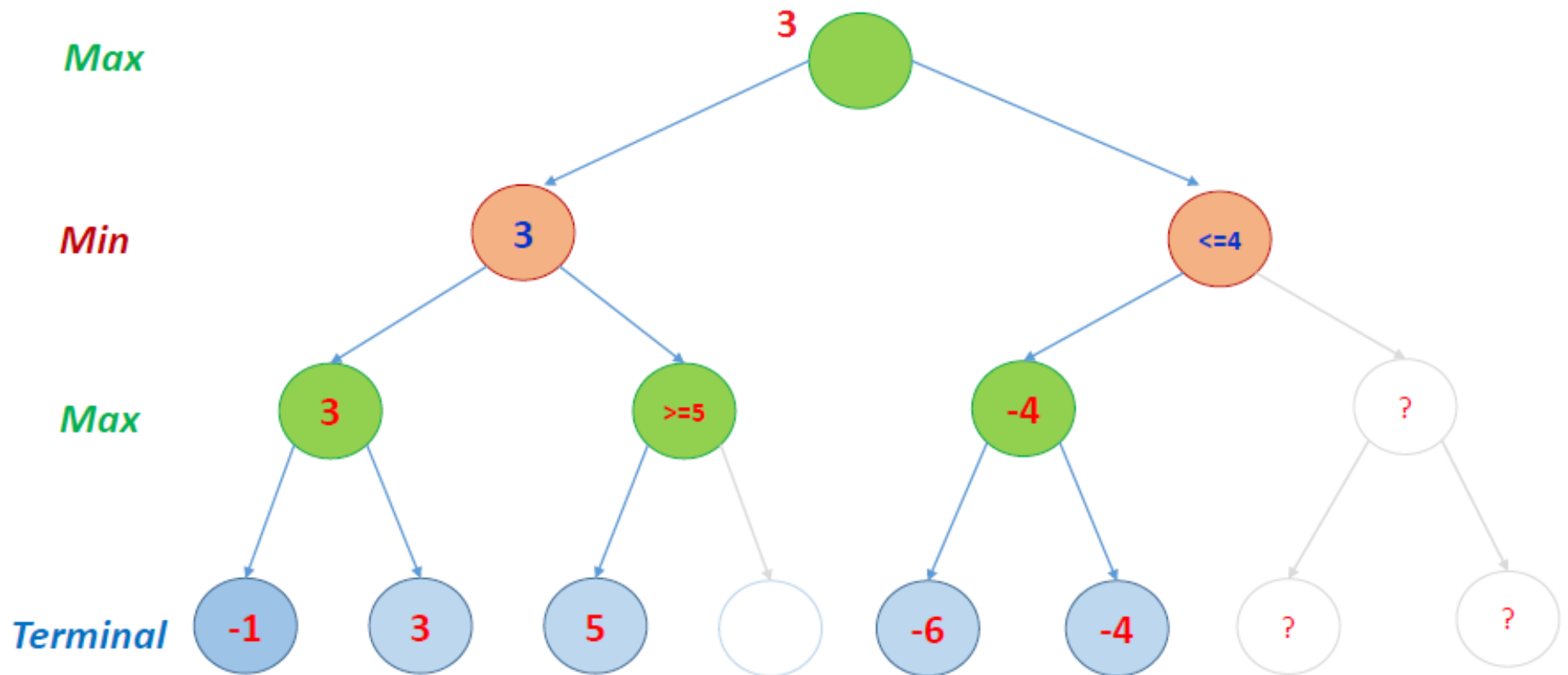
Example 2



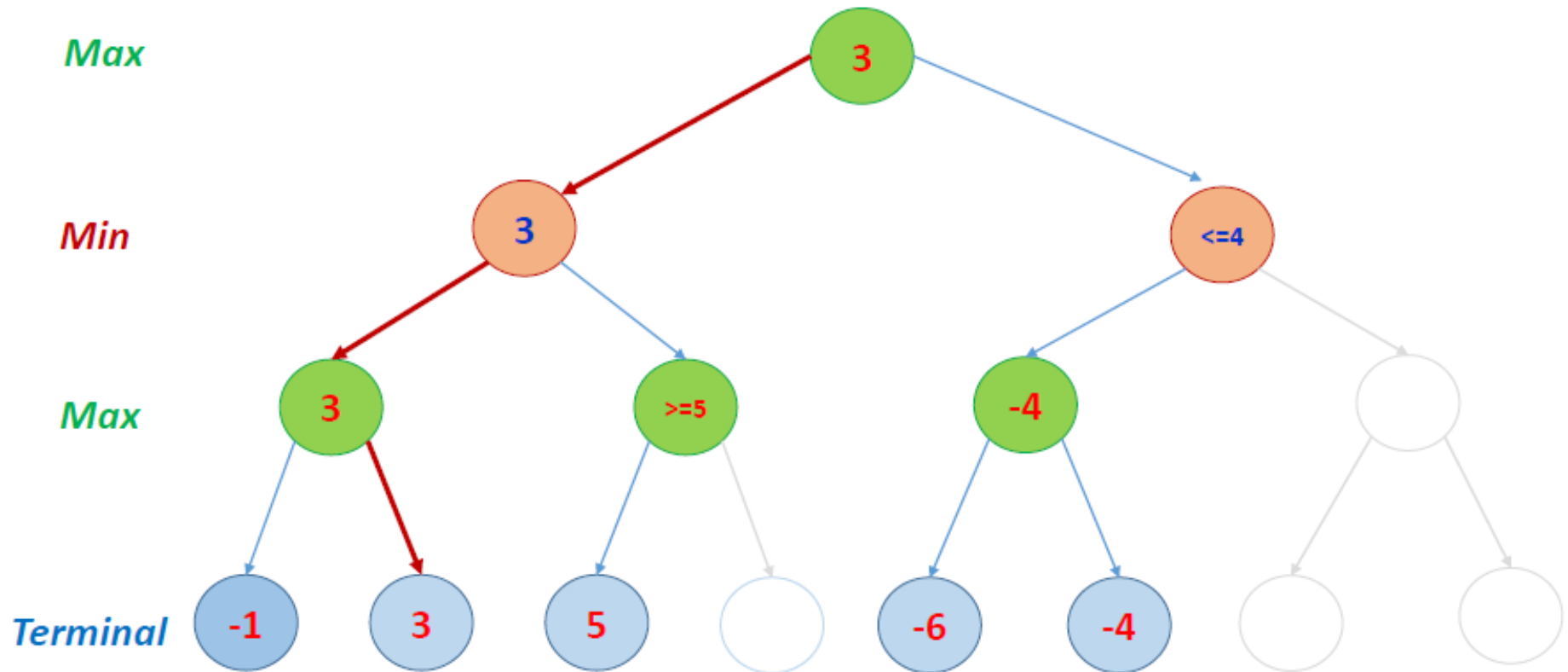
Example 2



Example 2

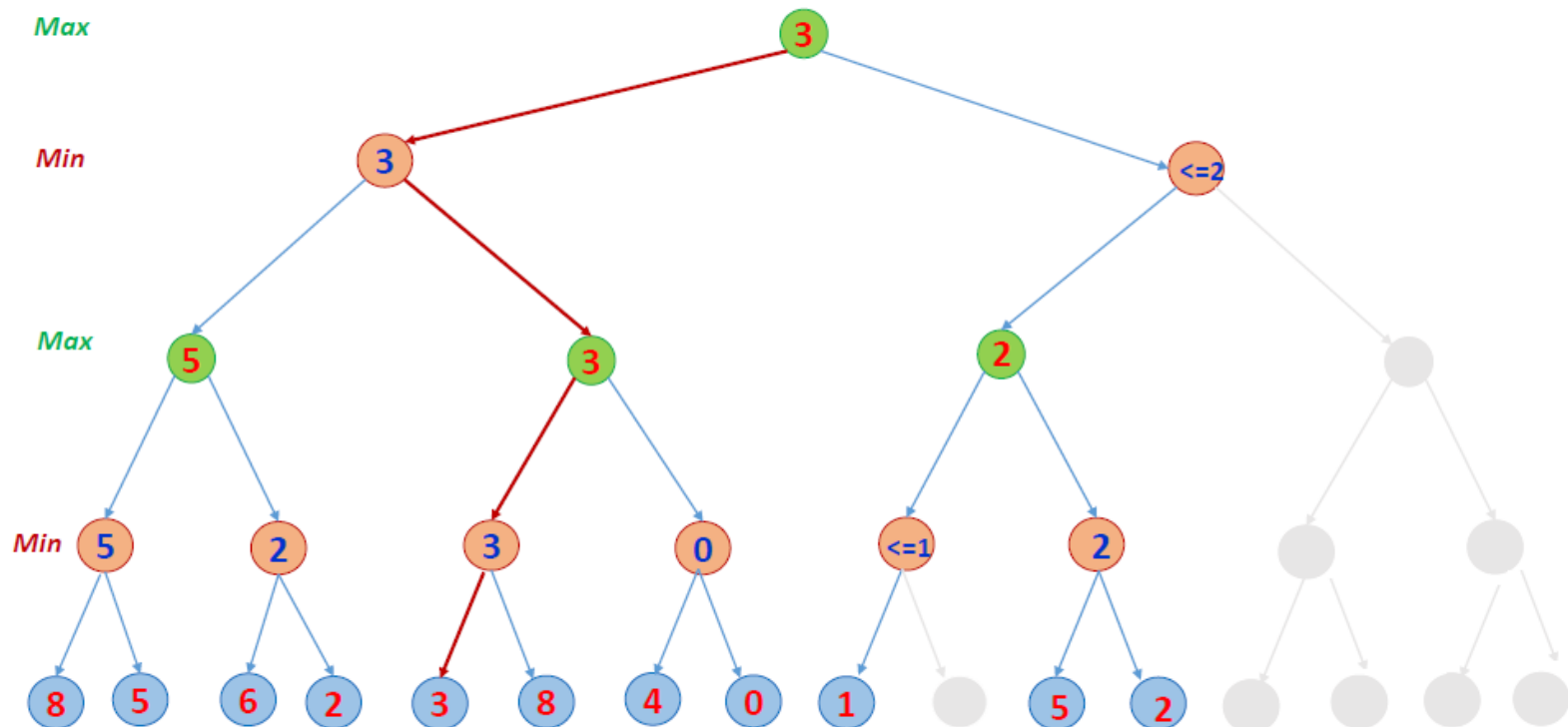


Example 2



Homework

- Alpha - Beta Pruning algorithm
- Benefits of Alpha - Beta Pruning.
- Give the reasoning of below alpha-beta pruning of a game tree.



References

1. Stuart Russell, Peter Norvig, “Artificial Intelligence-A Modern Approach”, Pearson.
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, McGraw-Hill.
3. E Charniak and D McDermott, “Introduction to Artificial Intelligence”, Pearson.
4. PPT of Dr.R.DeviPriya, Associate Professor, Department of Information Technology, Kongu Engineering College
5. <https://www.geeksforgeeks.org/minimax-algorithm-in-game-theory-set-4-alpha-beta-pruning/>
6. Slide-2 image via <https://www.euroyardservice.com/services/trees-shrub-trimming/>

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Thank You.

