

Fundamentals of Artificial Intelligence

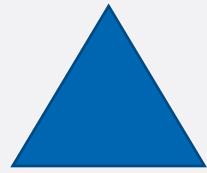
Laboratory

Dr. Mauro Dragoni

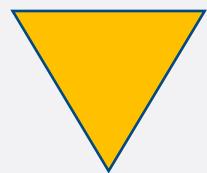
Department of Information Engineering and Computer Science
Academic Year 2022/2023

Exercise 6.1

- Minimax with alpha-beta pruning



- MAX nodes. The goal at a MAX node is to maximize the value of the subtree rooted at that node. To do this, a MAX node chooses the child with the greatest value, and that becomes the value of the MAX node.



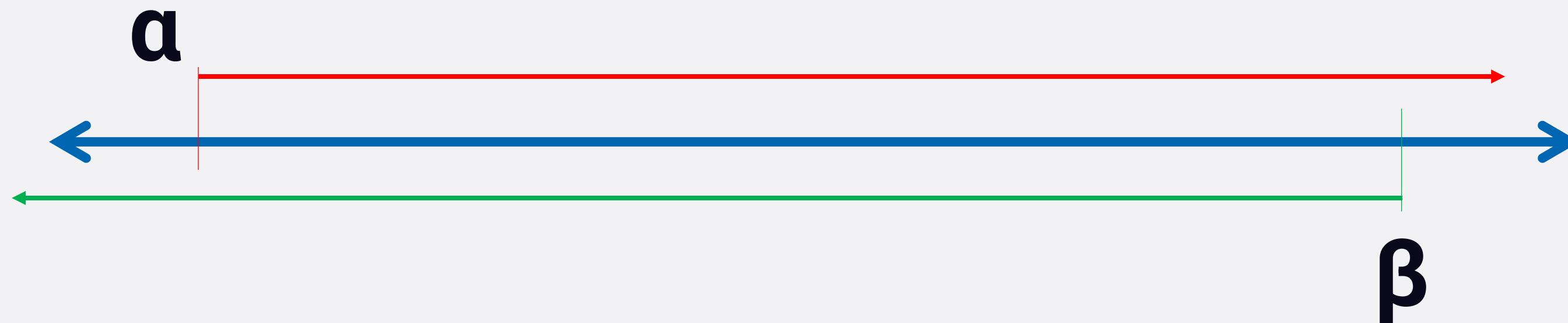
- MIN nodes. The goal at a MIN node is to minimize the value of the subtree rooted at that node. To do this, a MIN node chooses the child with the least (smallest) value, and that becomes the value of the MIN node.
- **a**: Alpha is the maximum lower bound of possible solutions. It is equivalent to $\geq -\infty$
- **B**: Beta is the minimum upper bound of possible solutions. It is equivalent to $\leq \infty$.

Exercise 6.1

- Minimax with alpha-beta pruning, tips:

- When any new node is being considered as a possible path to the solution, it can only work if:

$$\alpha \leq N \leq \beta$$

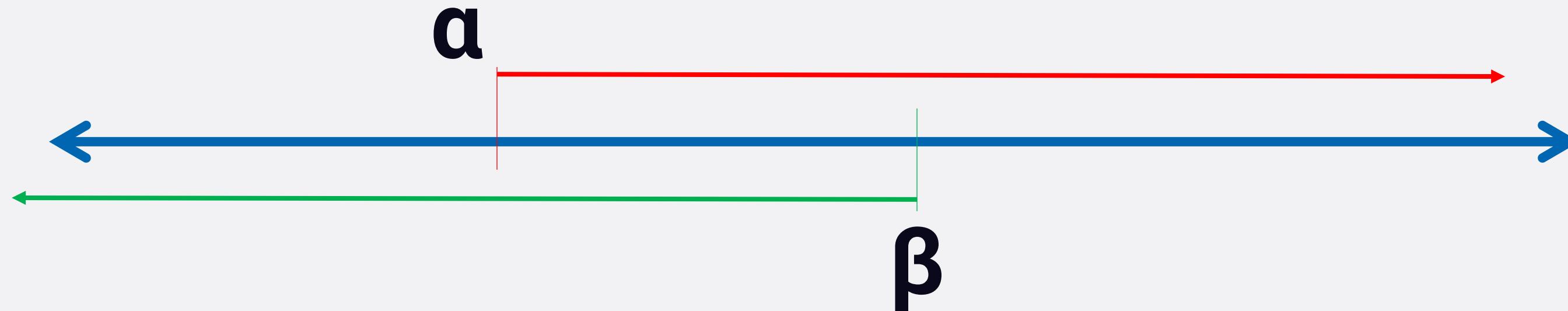


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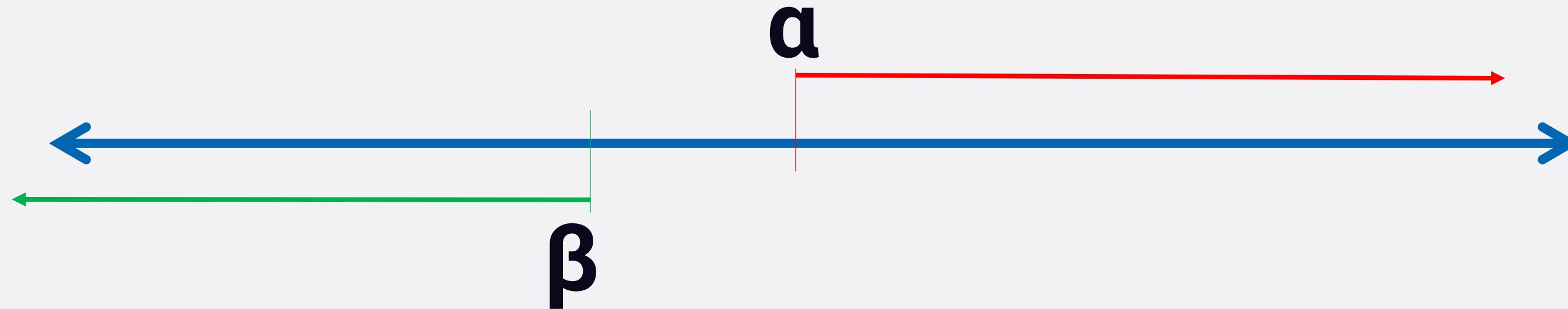


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- Minimax with alpha-beta pruning, tips:

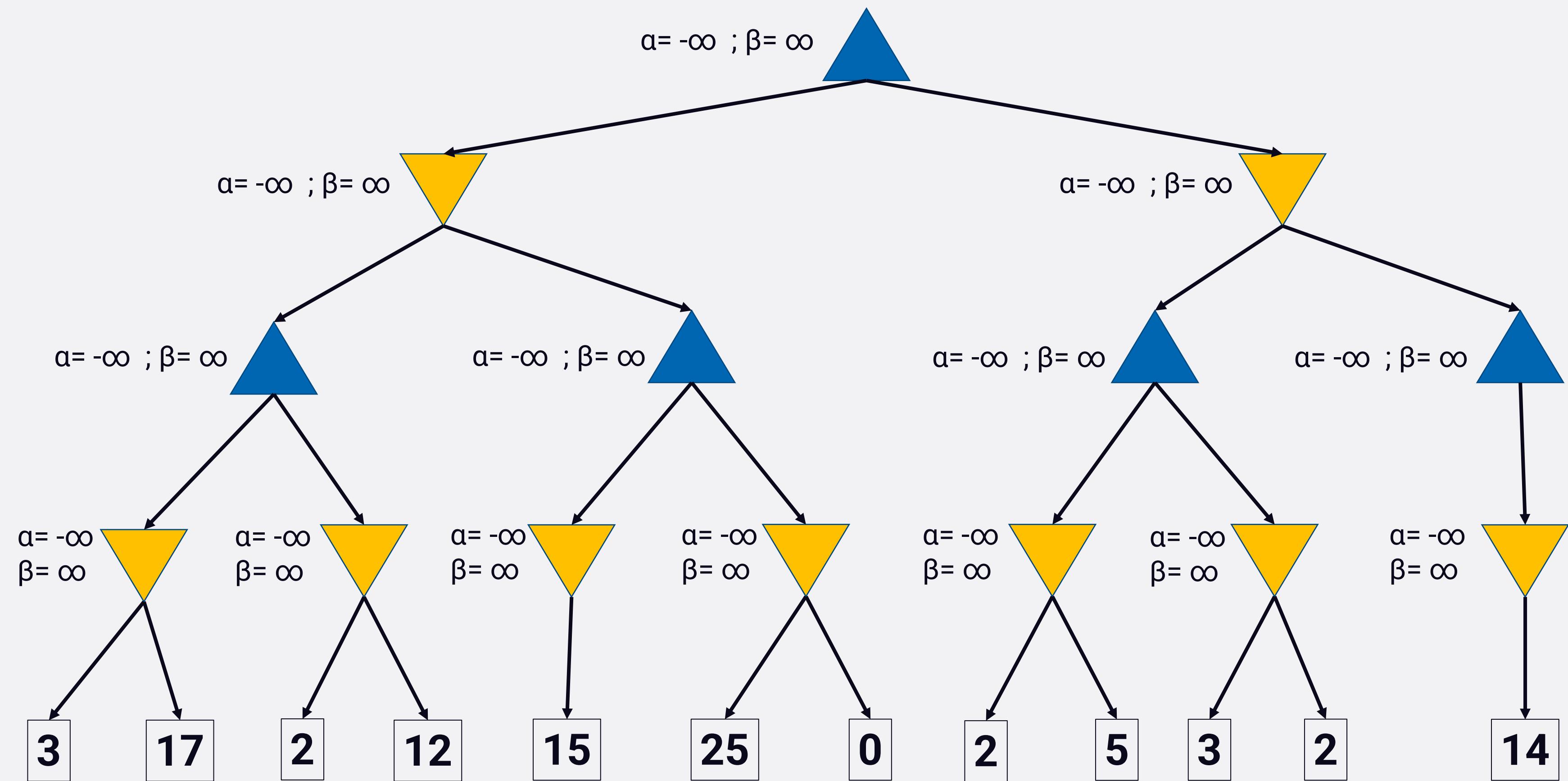
- When any new node is being considered as a possible path to the solution, it can only work if:

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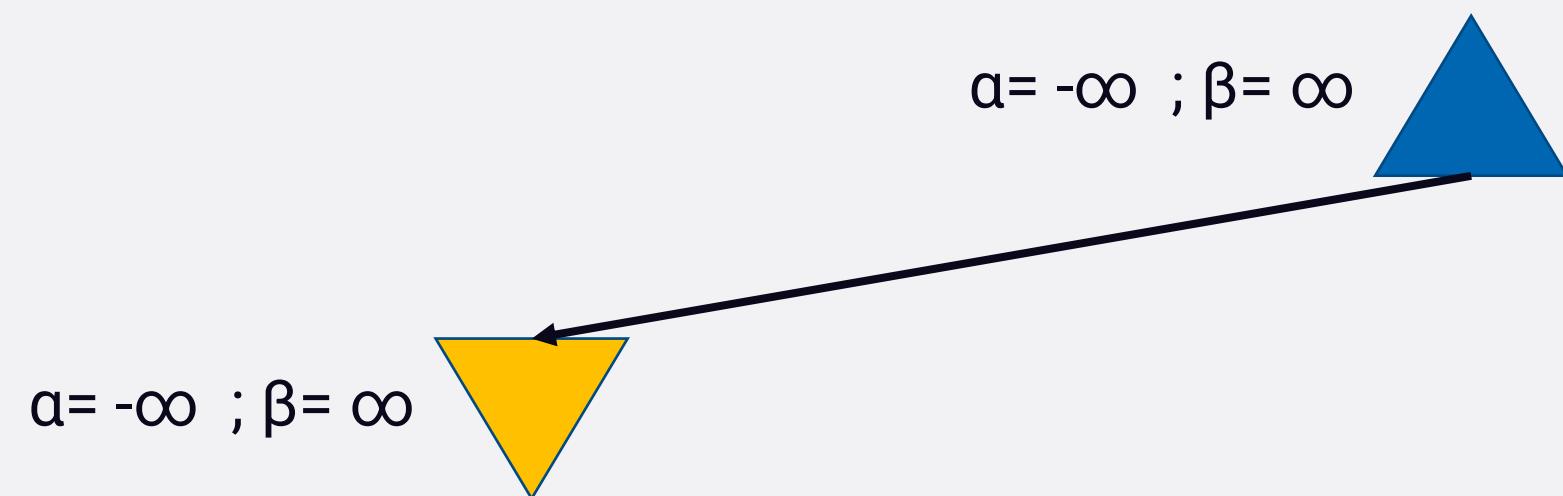
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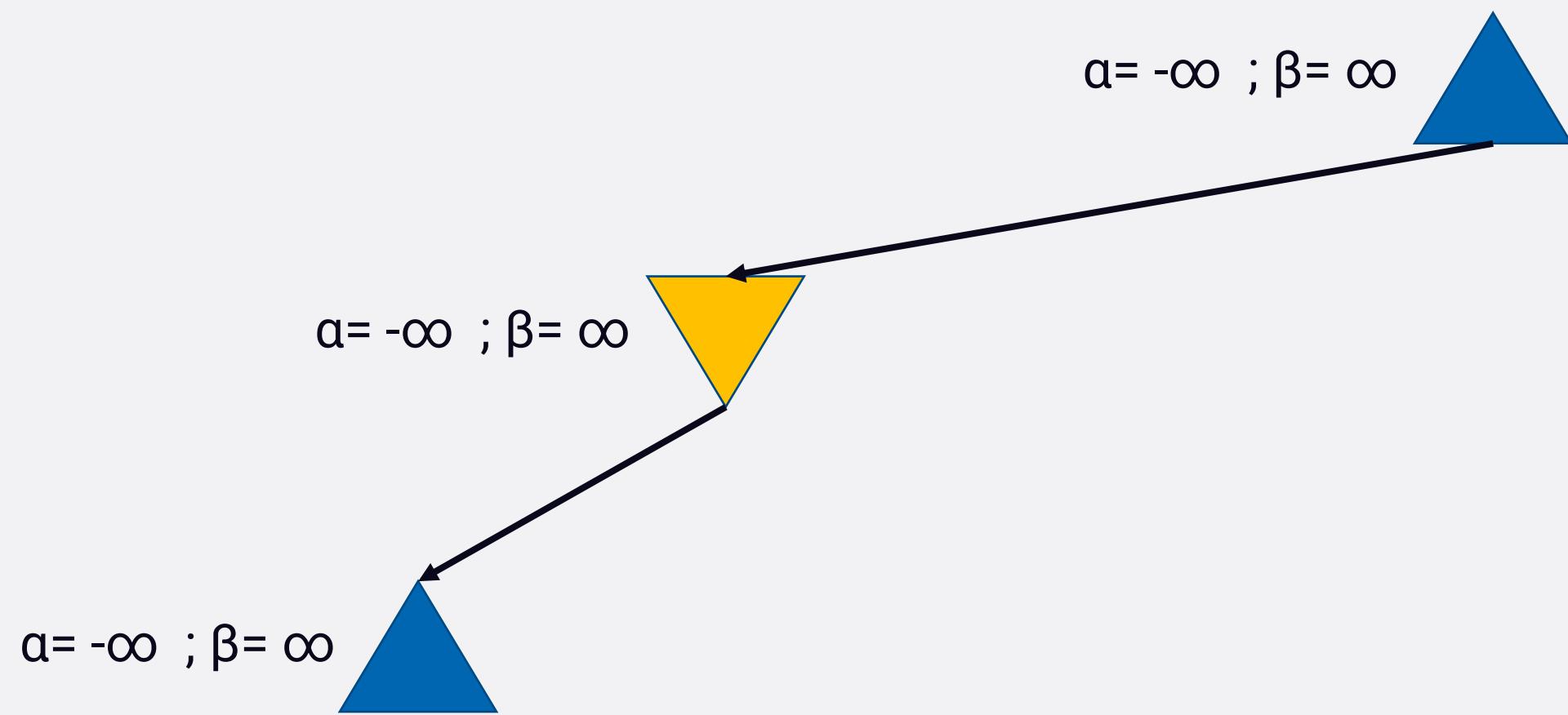
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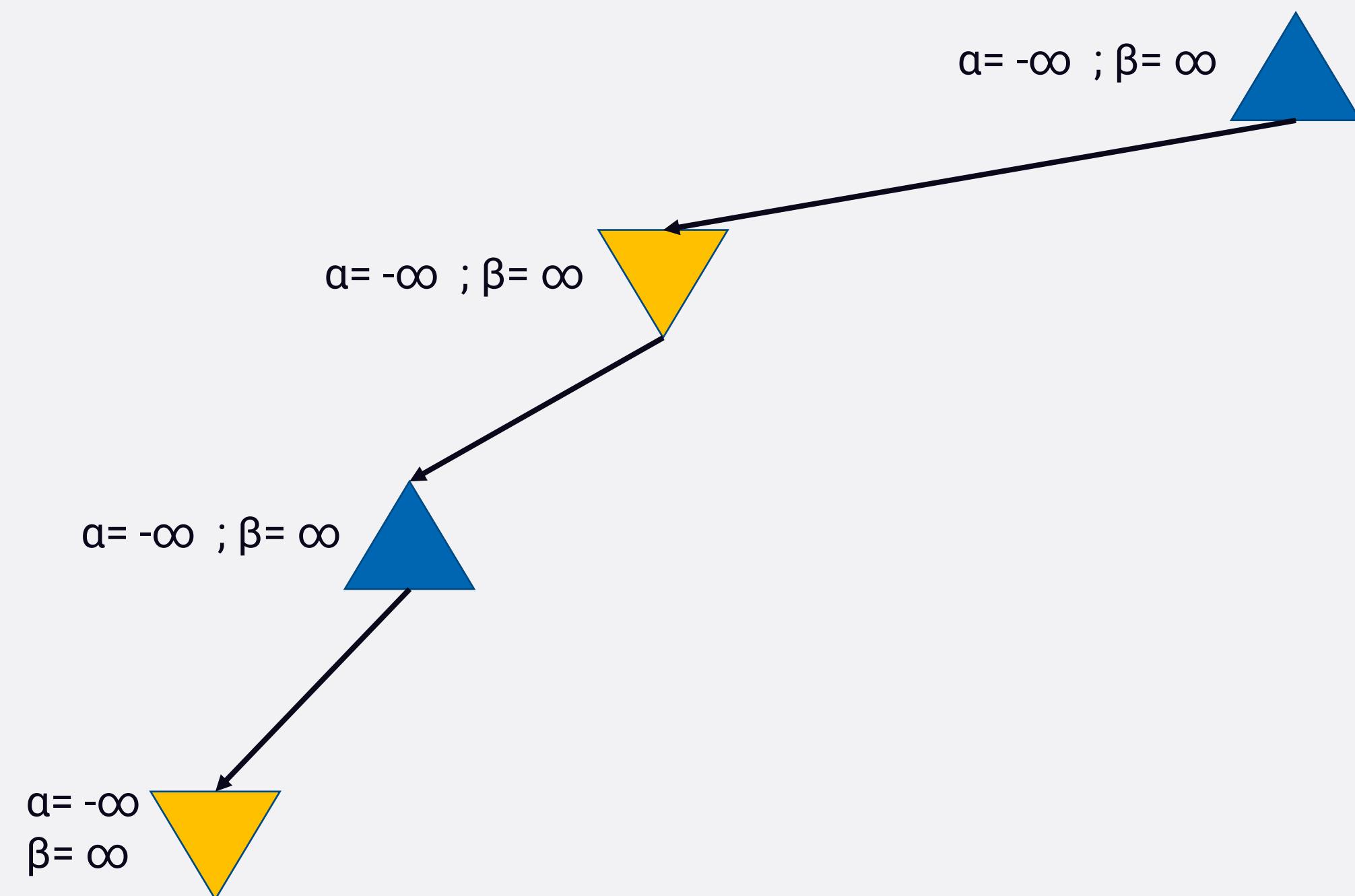
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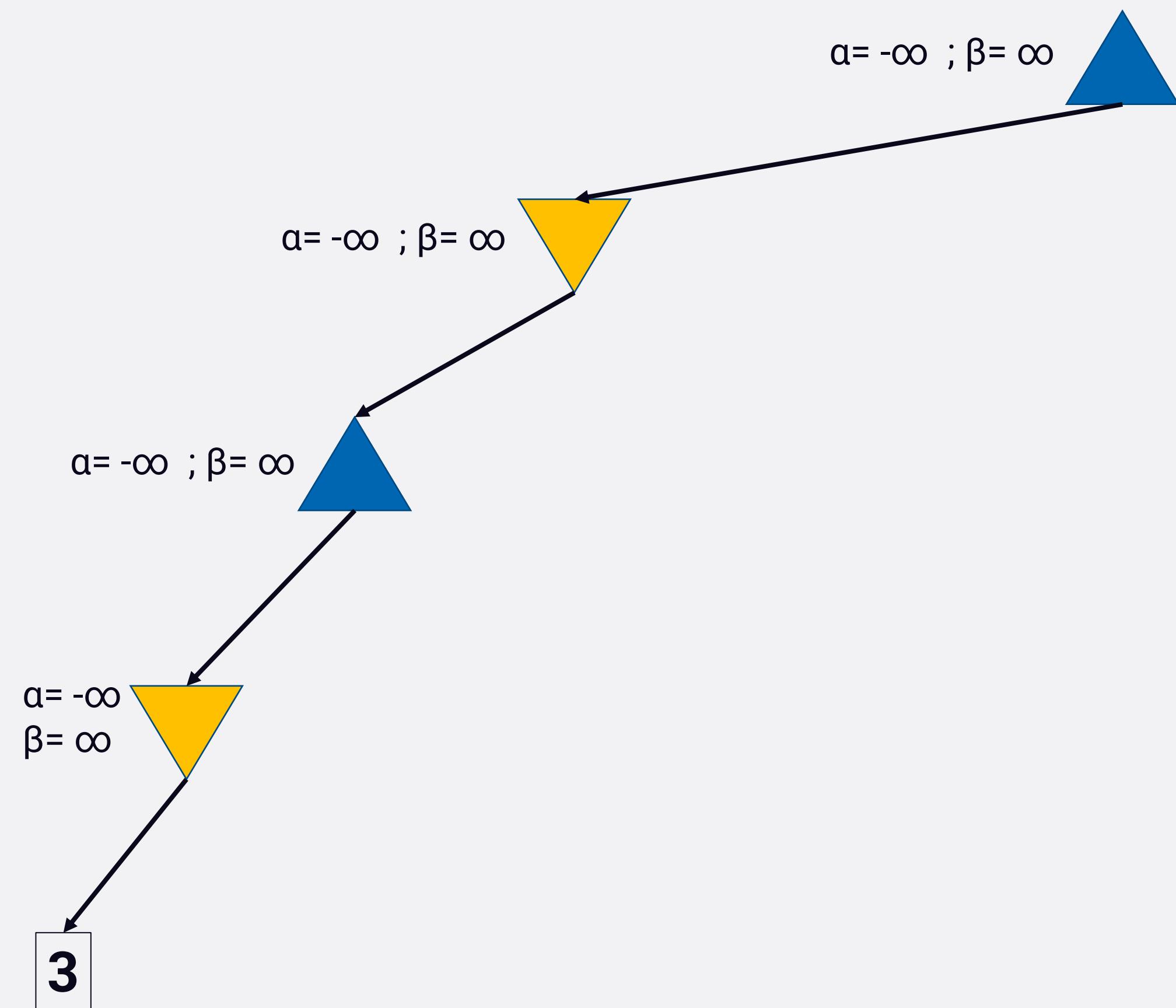
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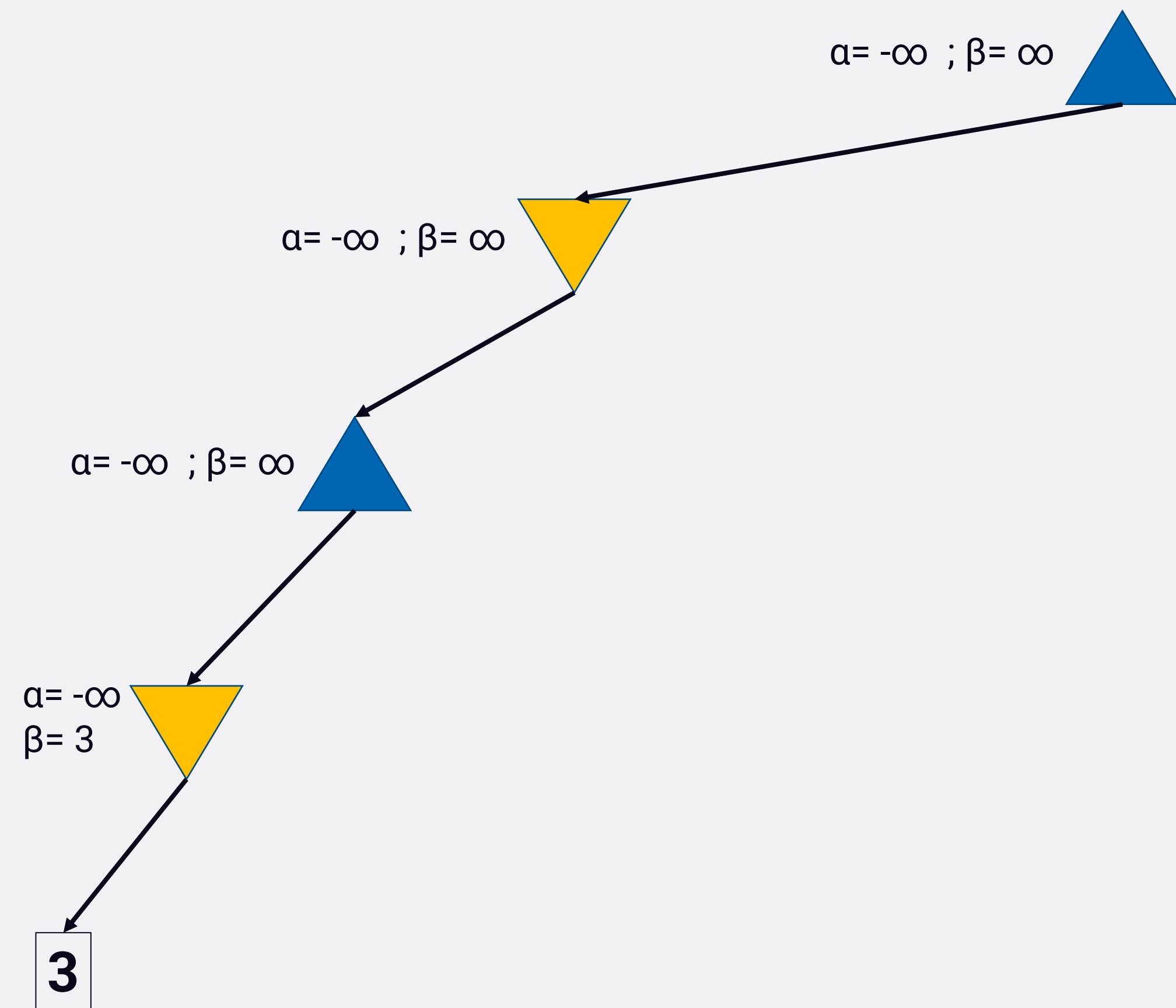
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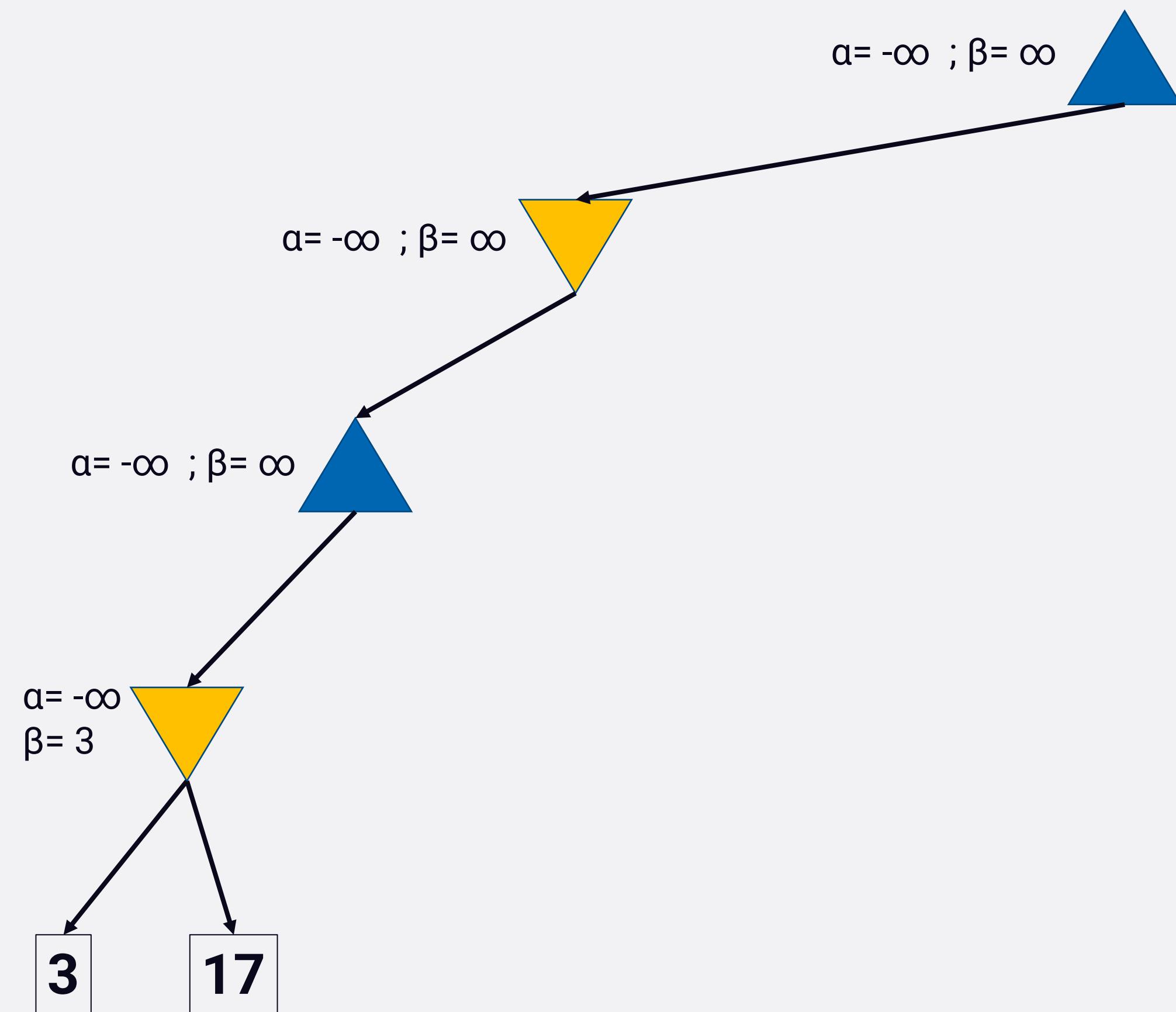
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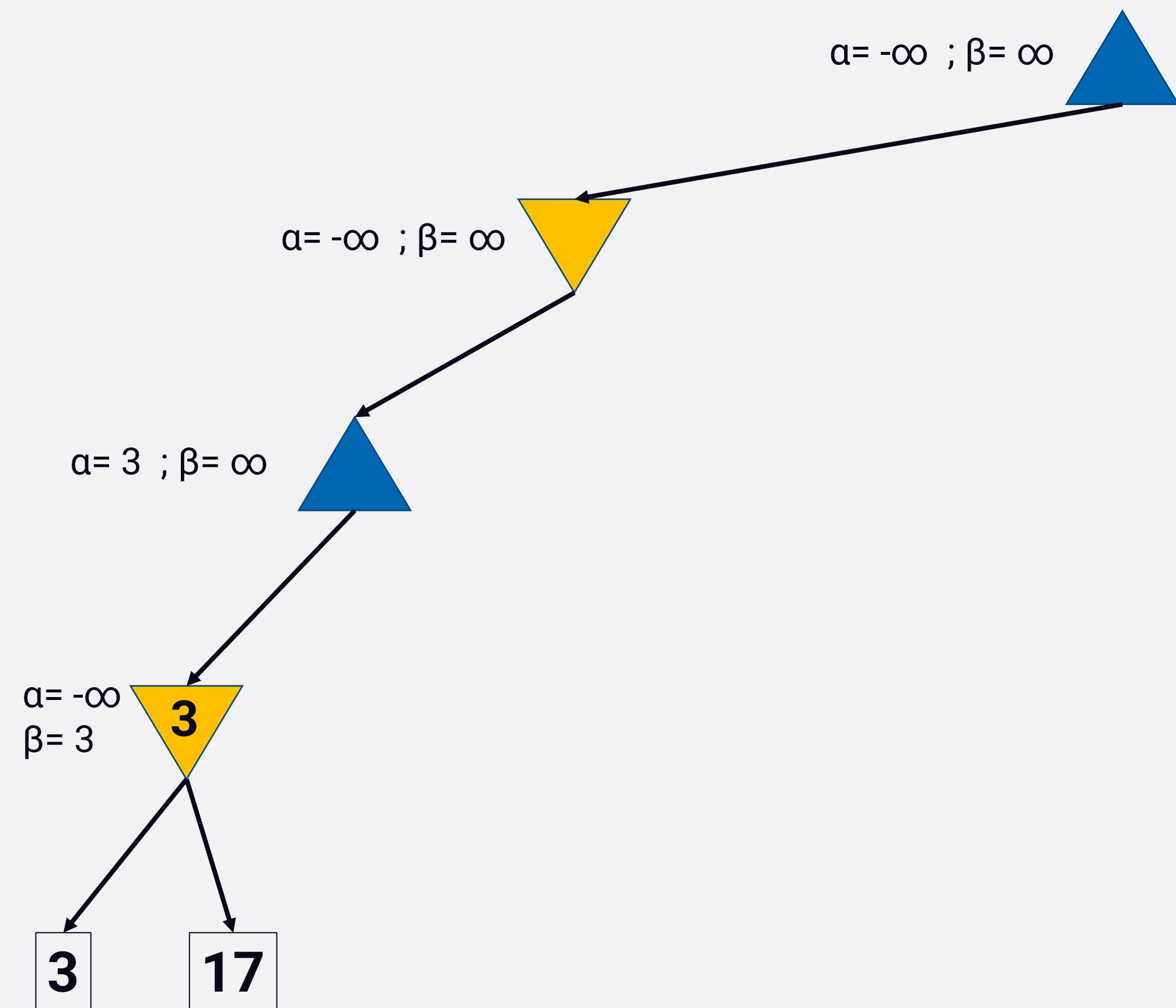
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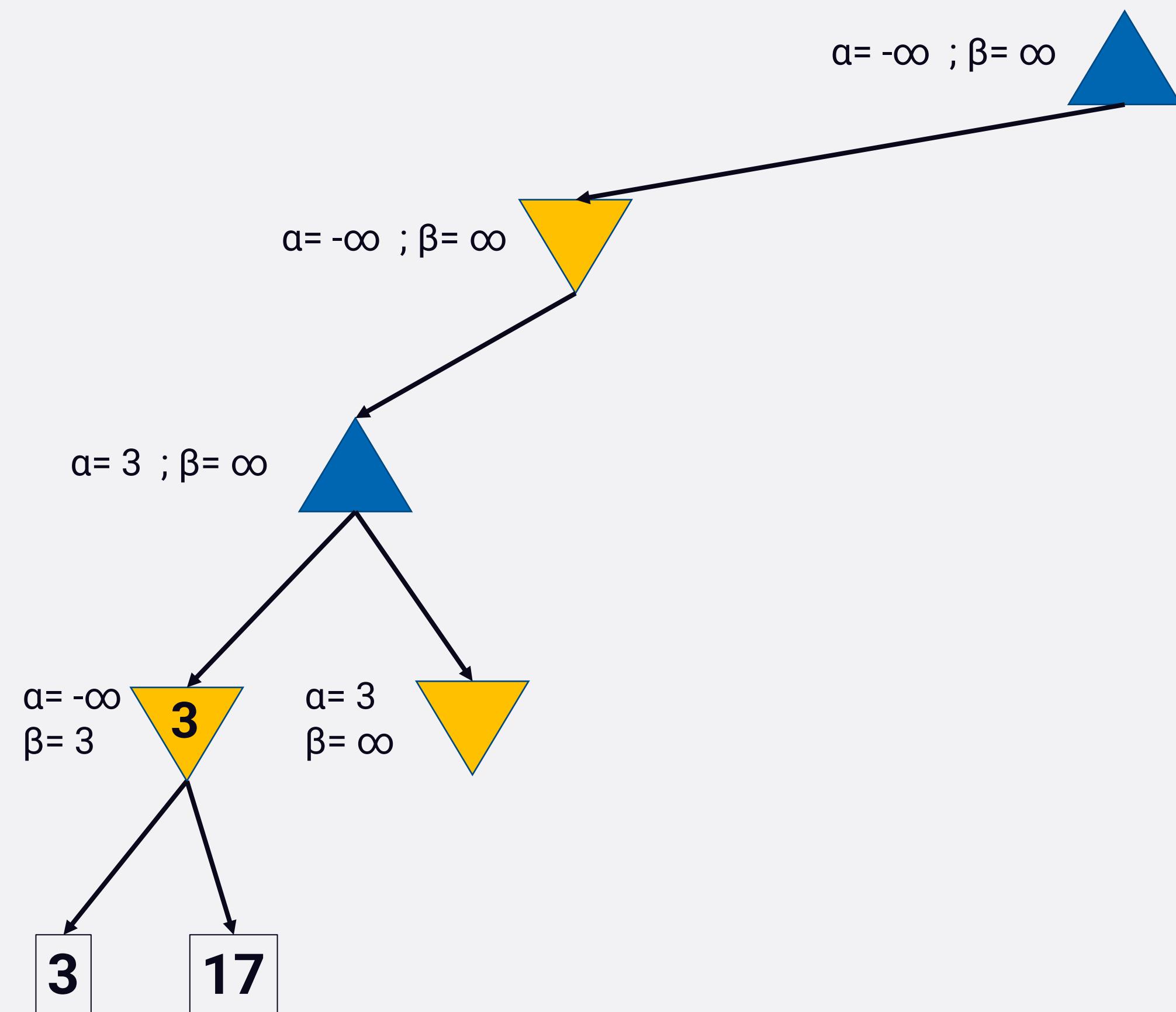
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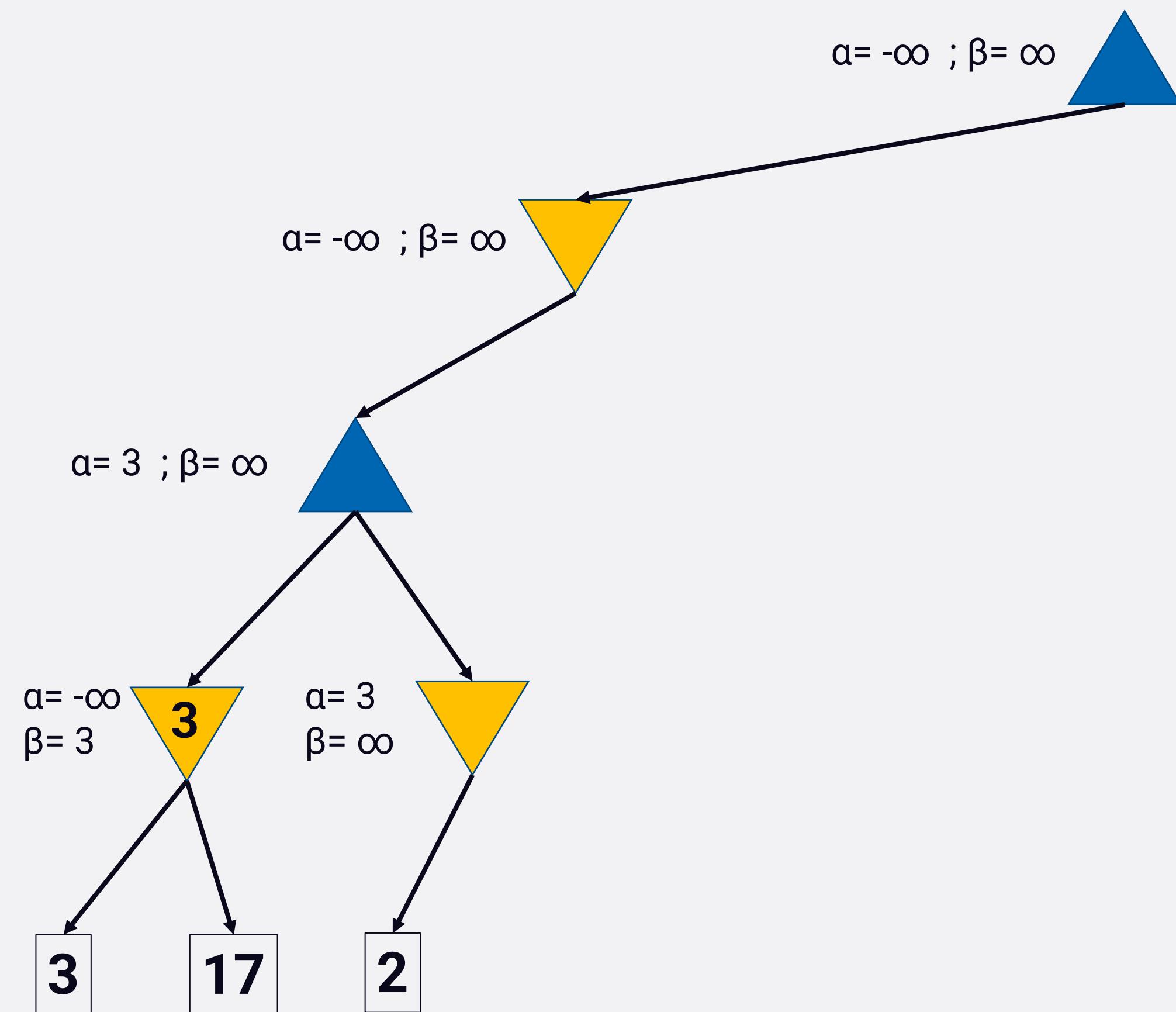
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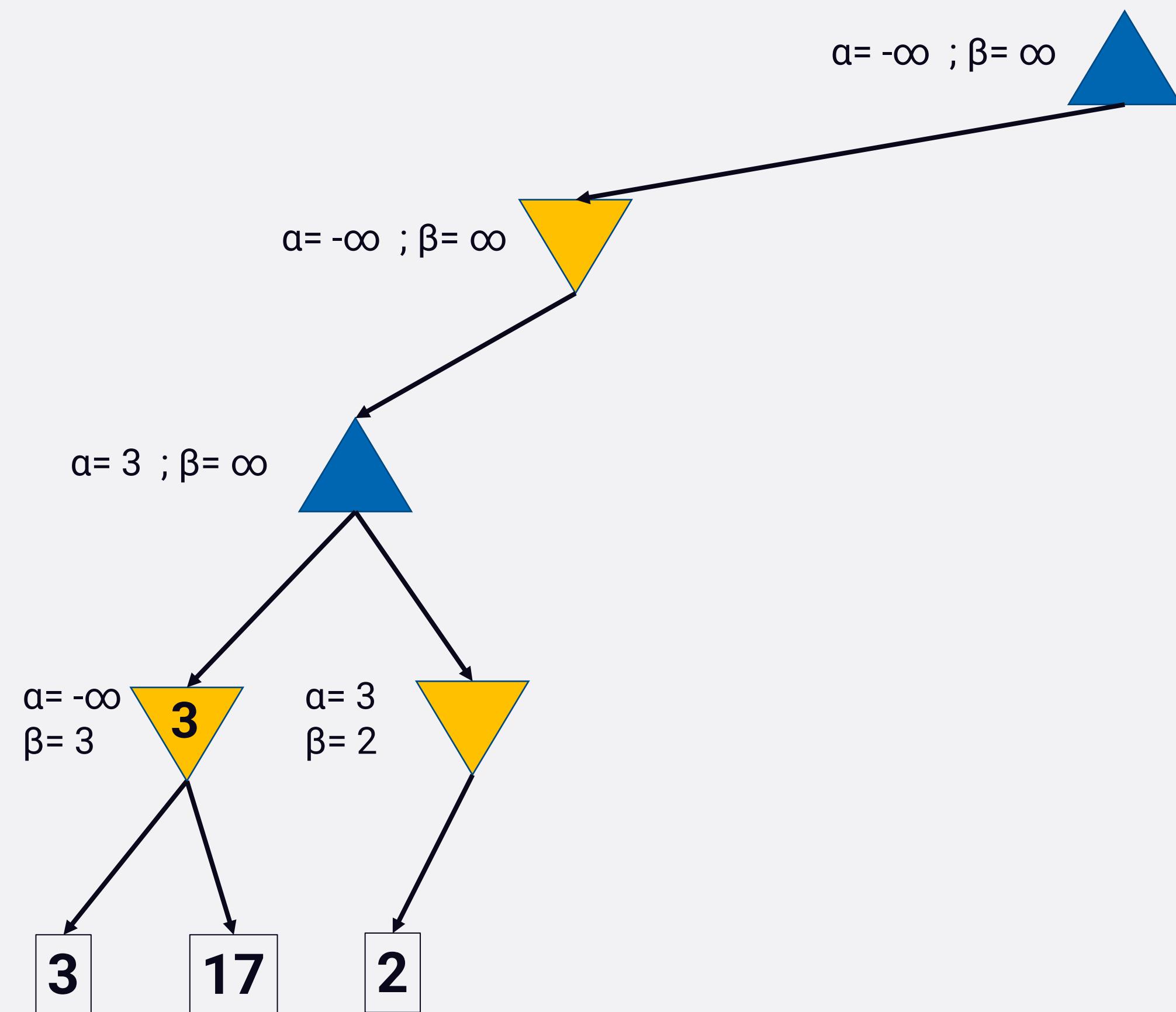
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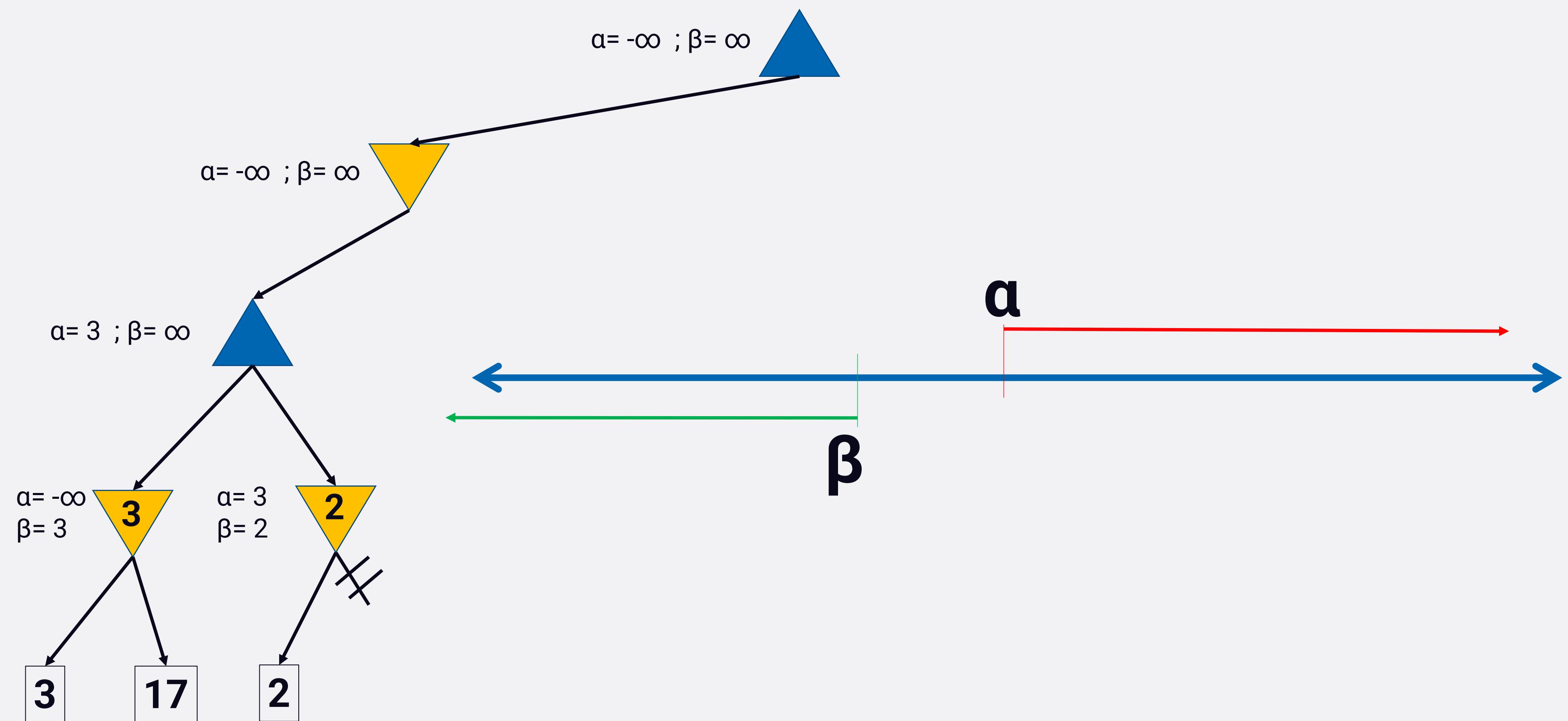
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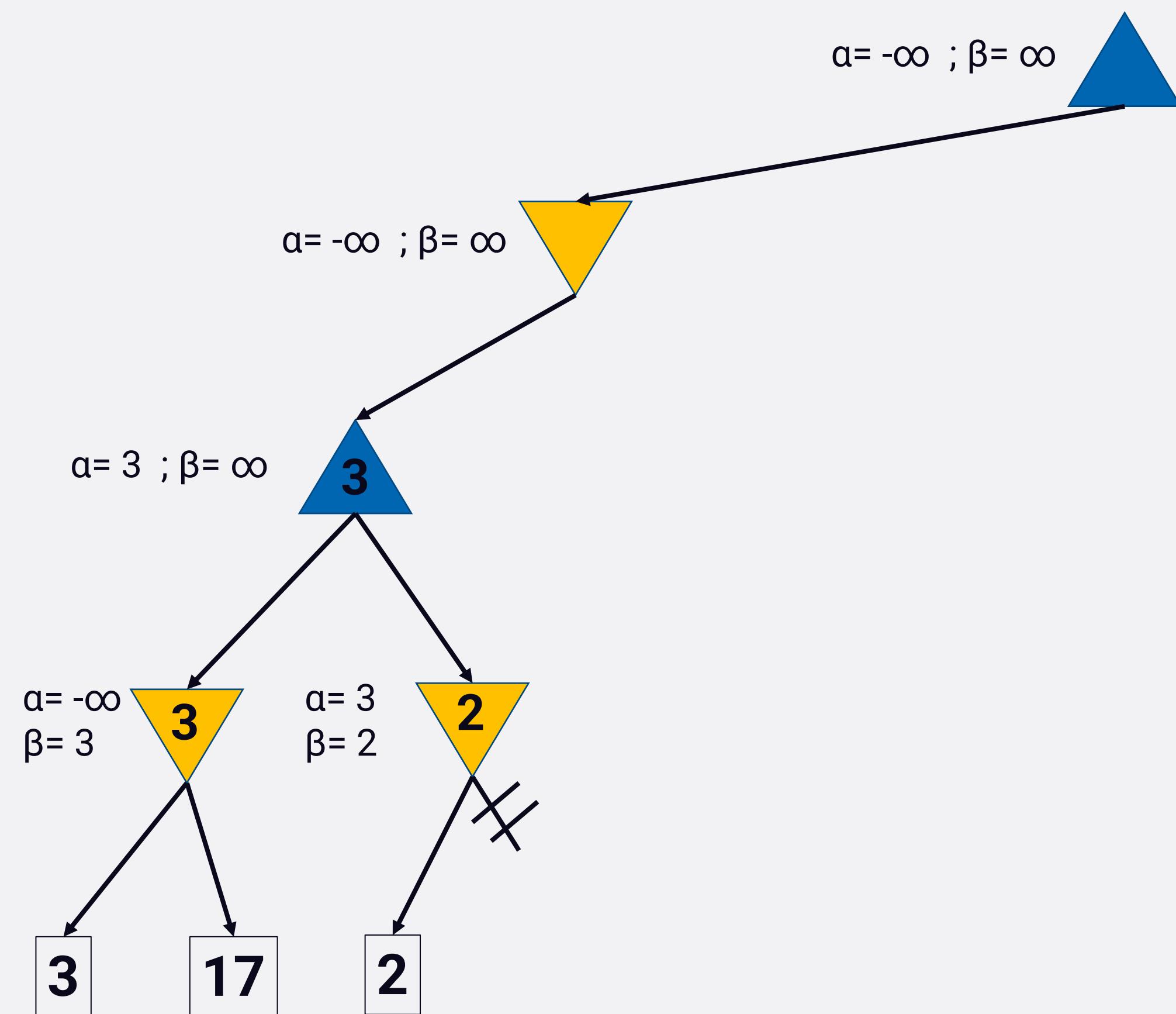
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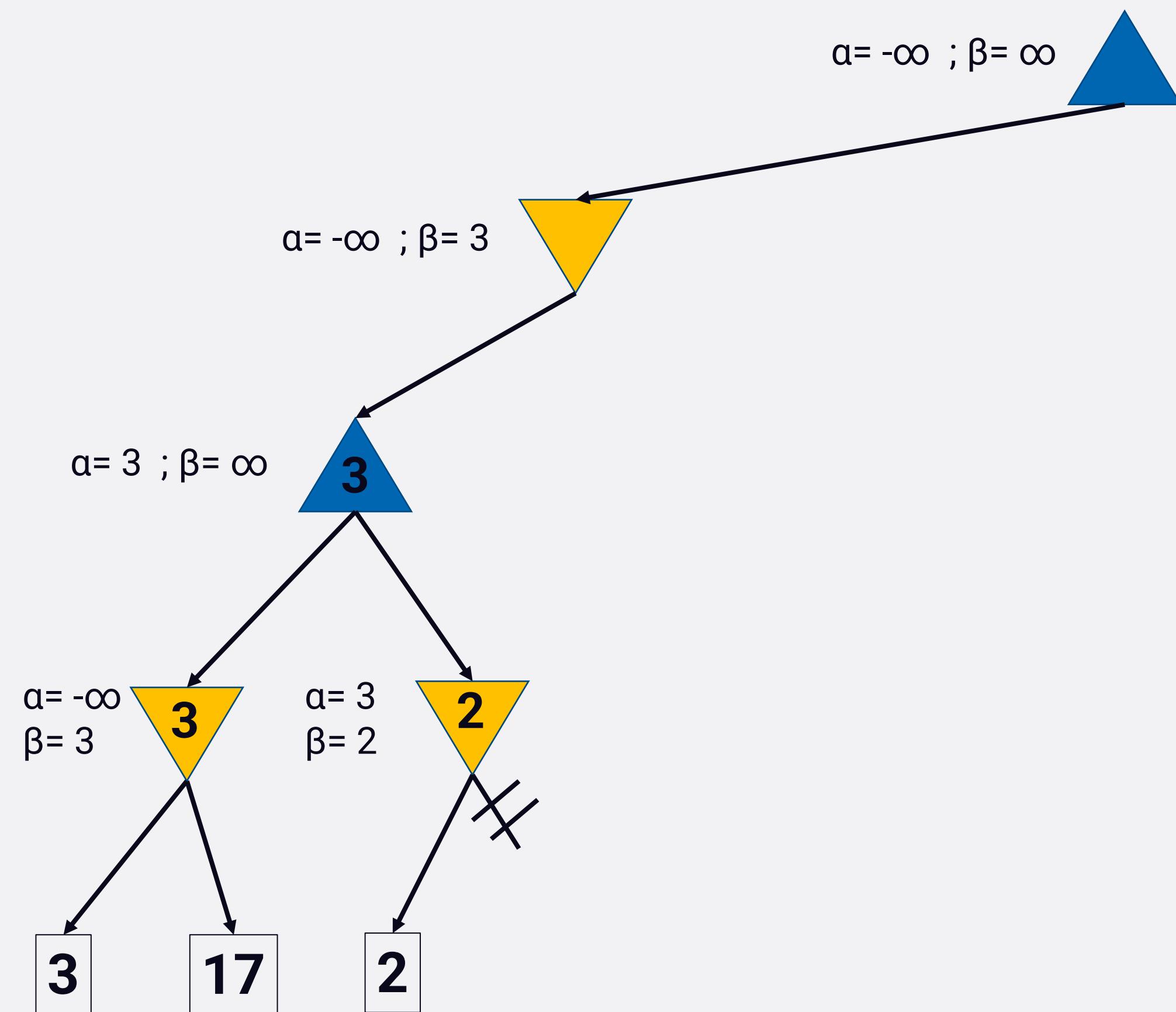
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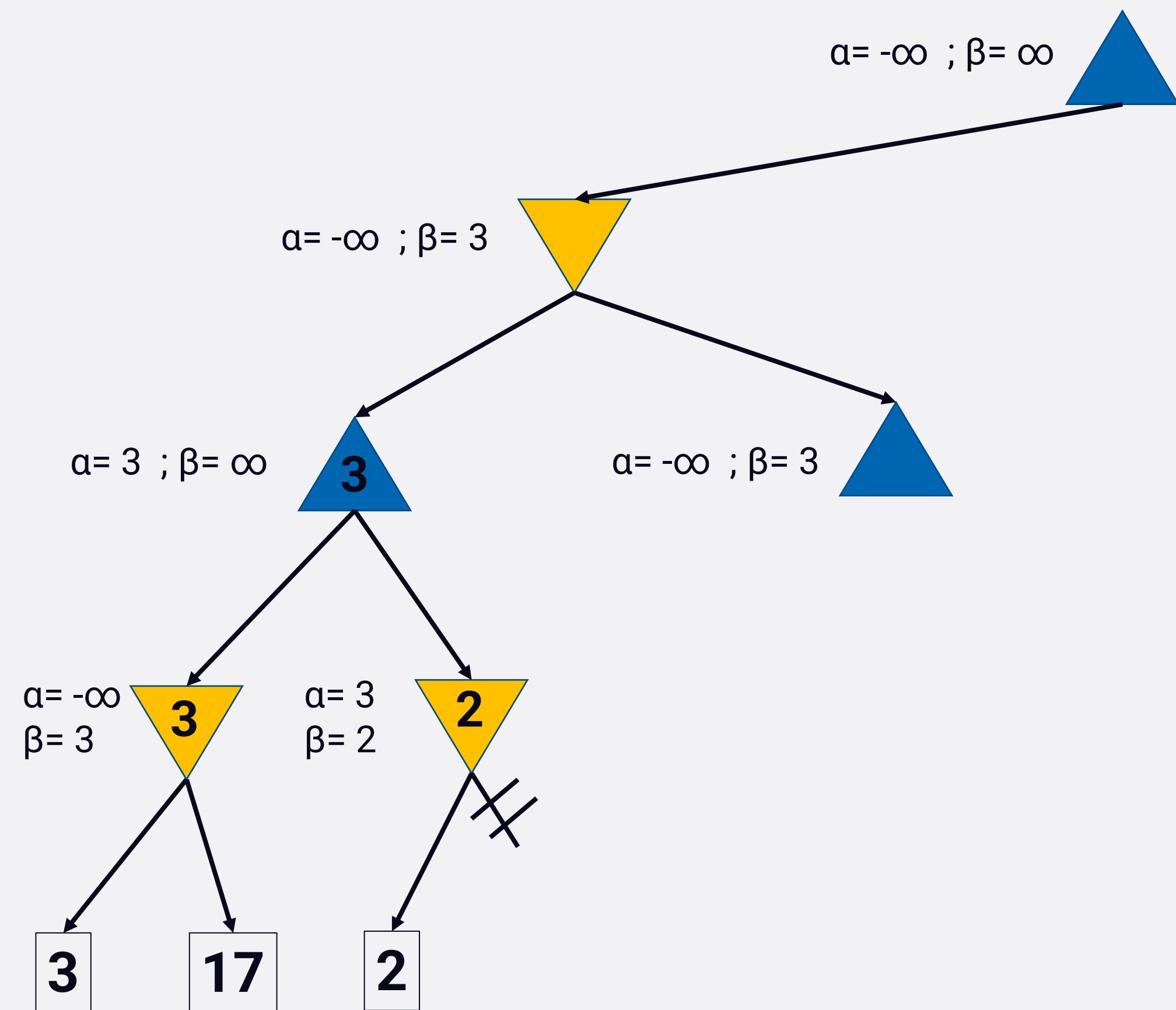
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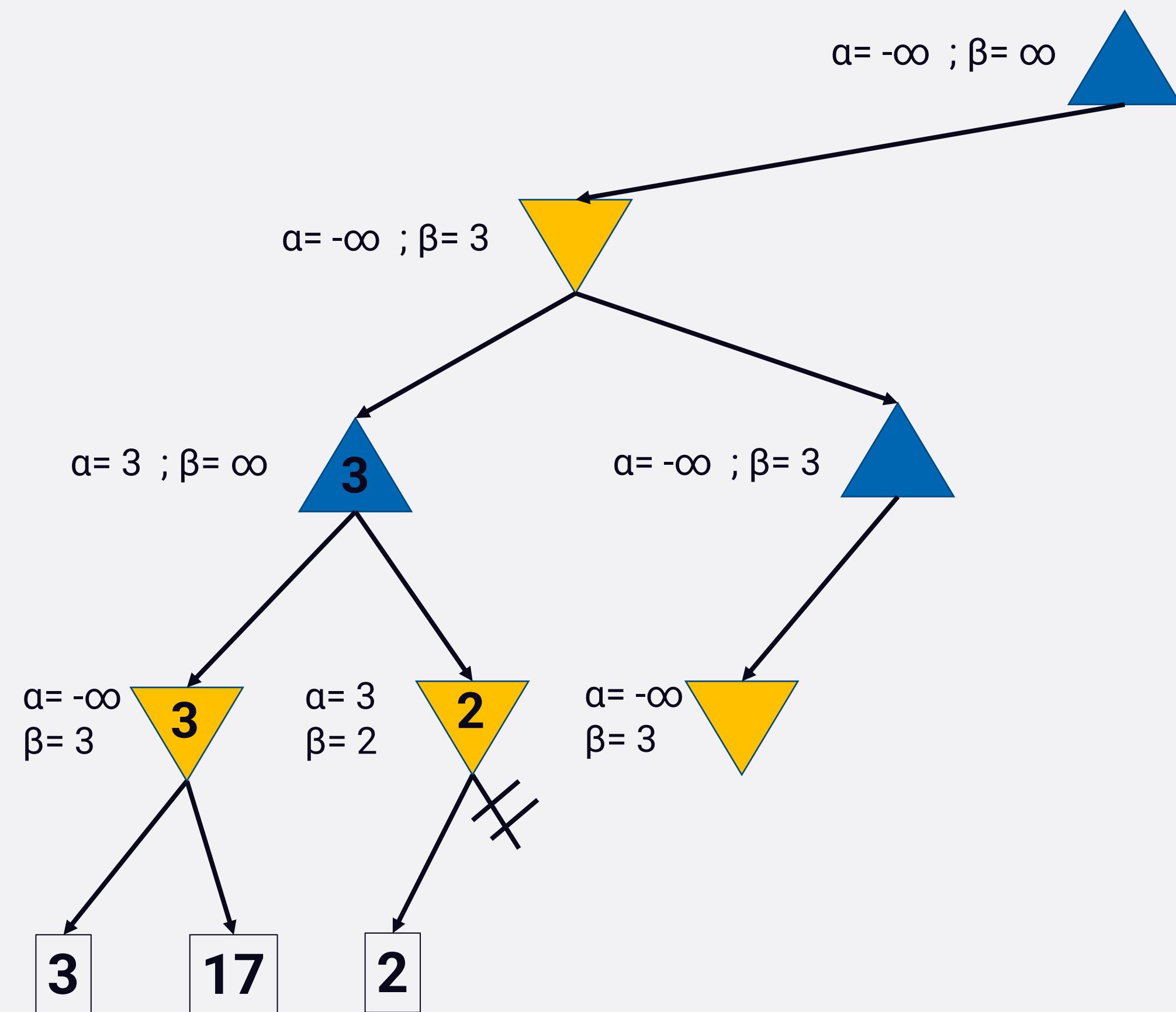
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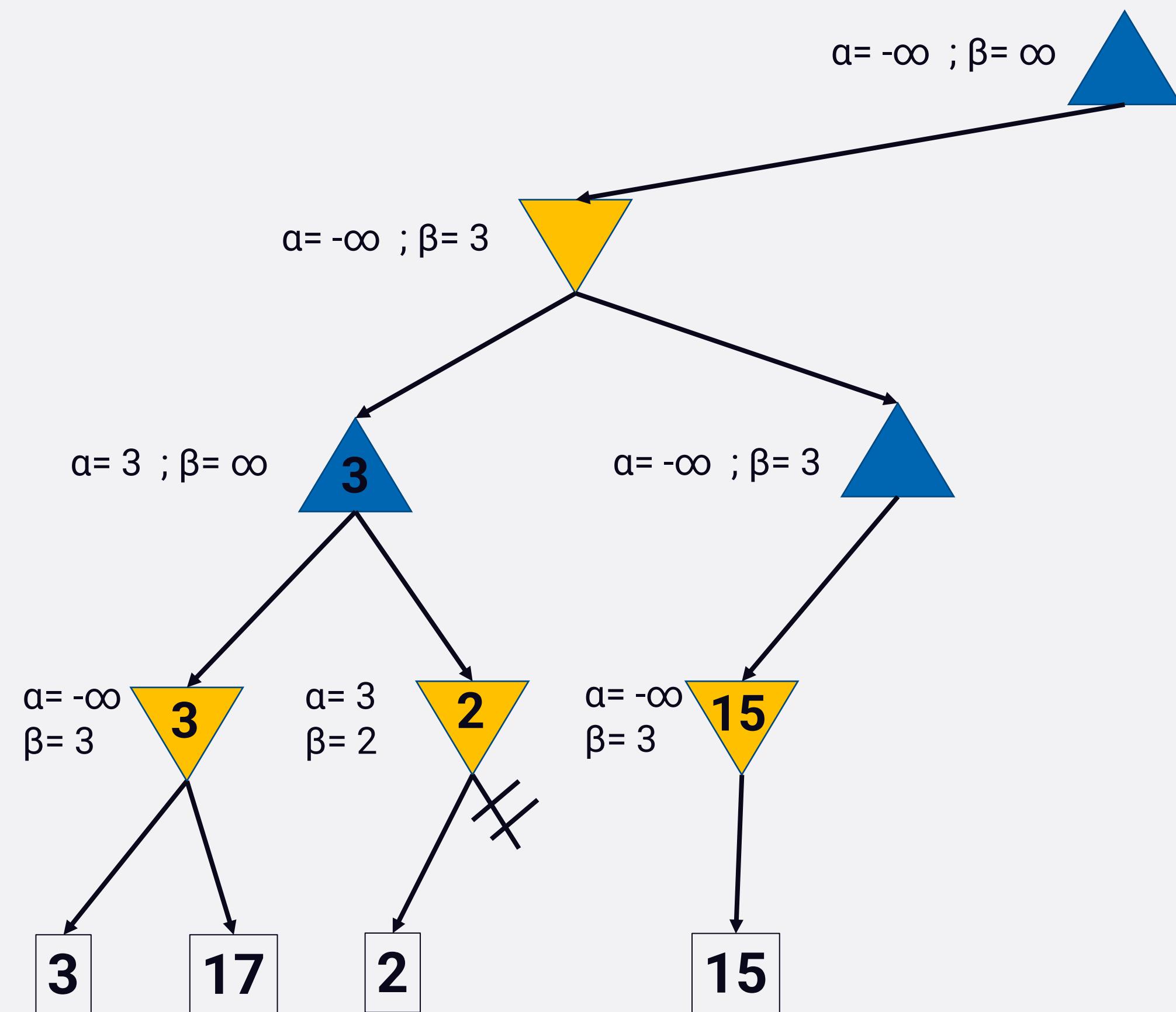
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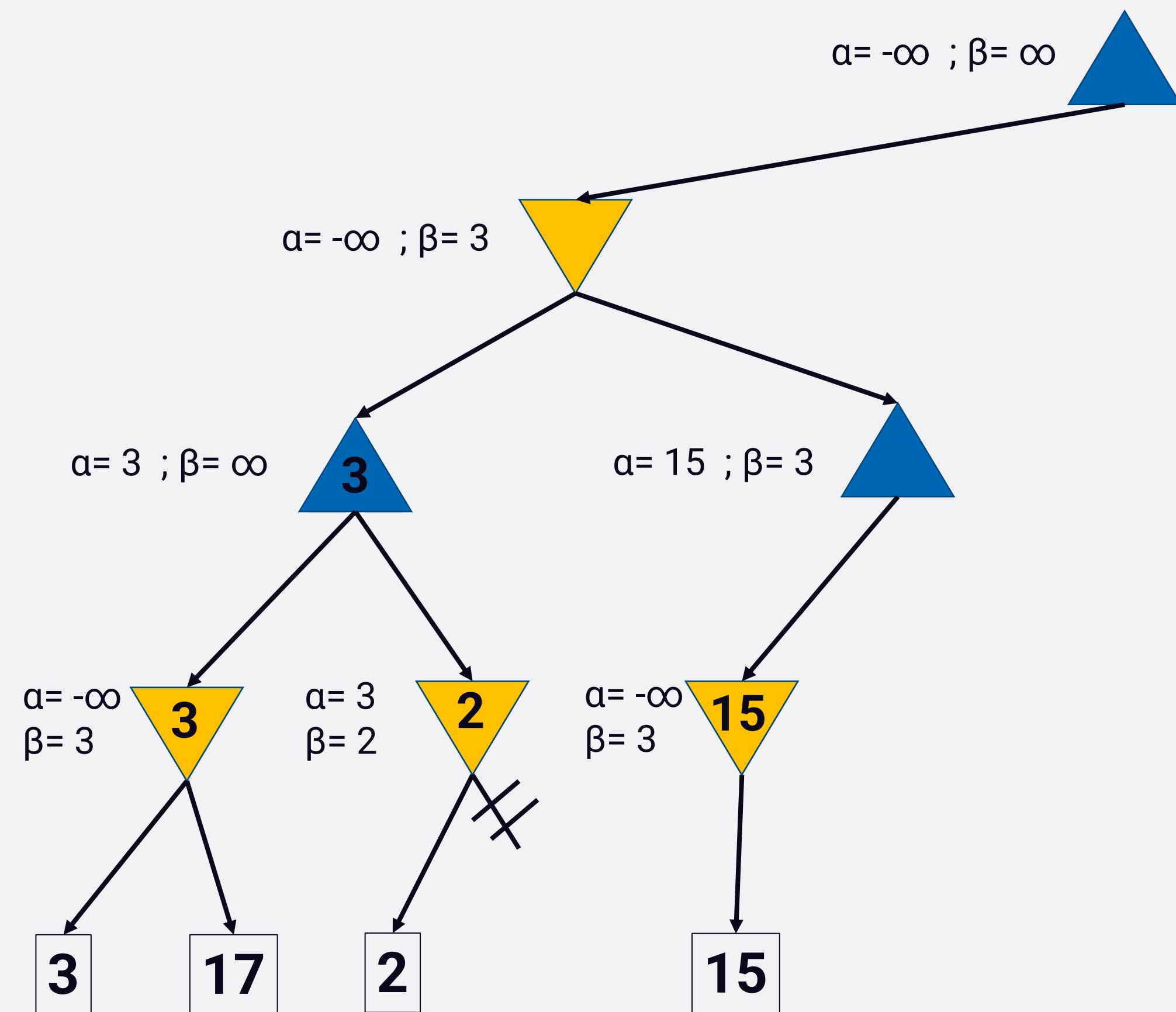
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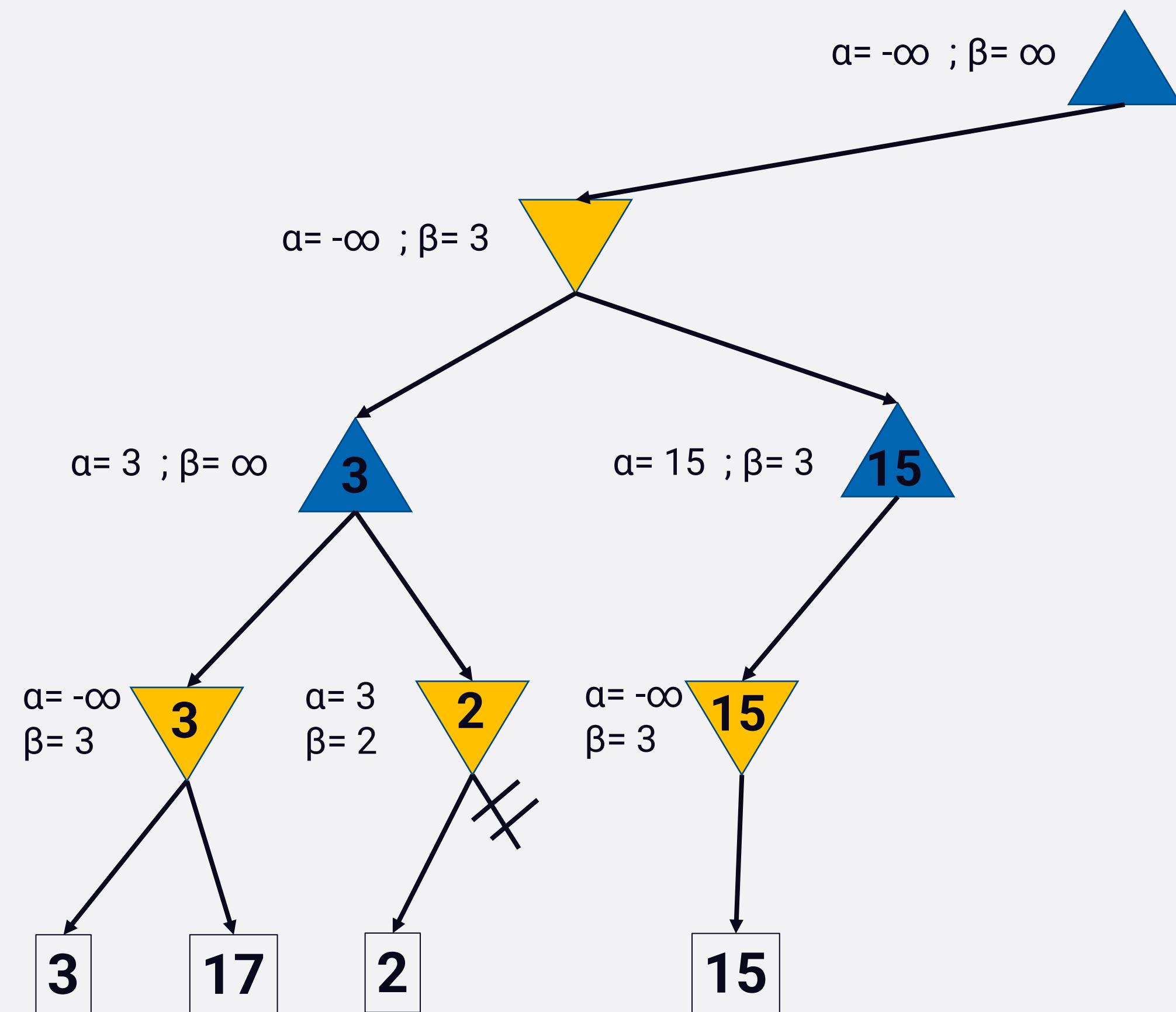
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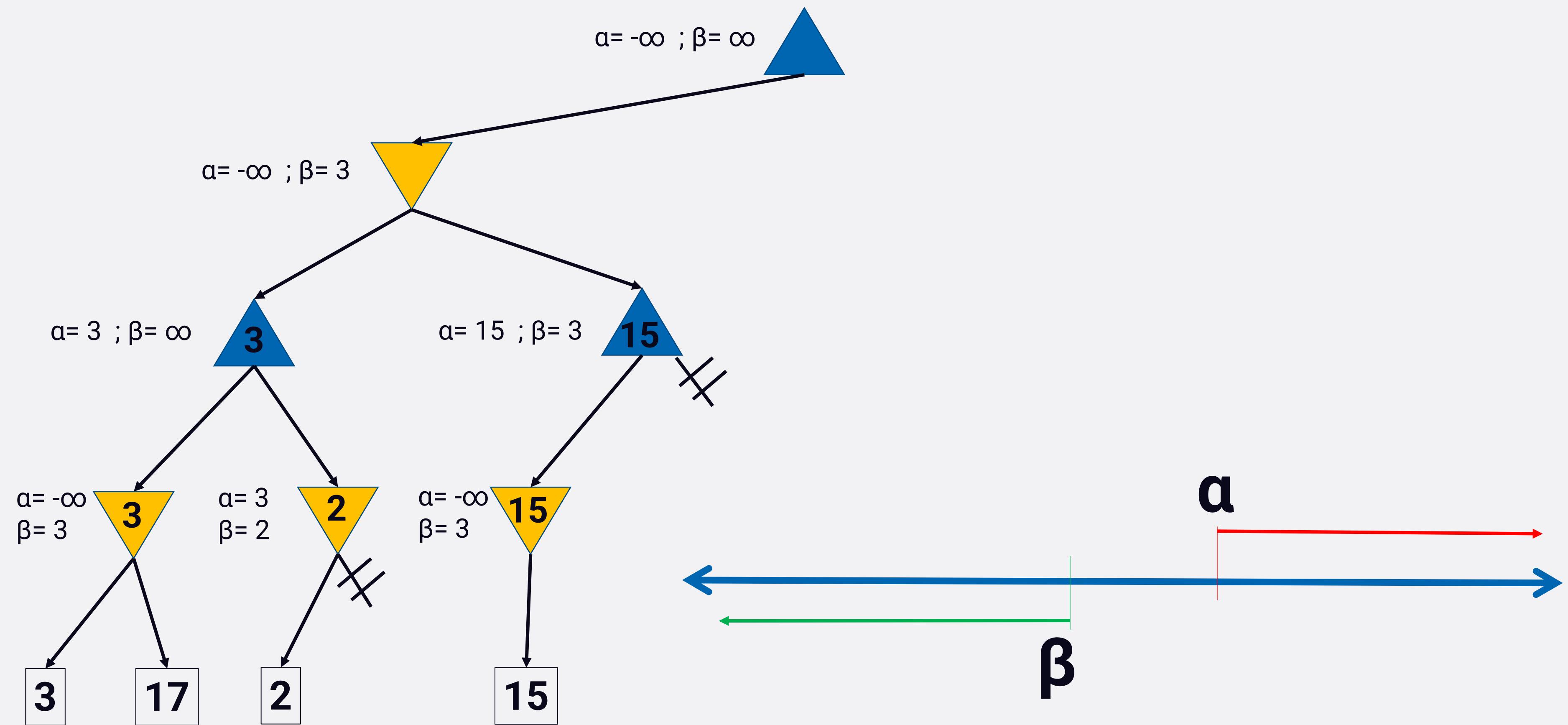
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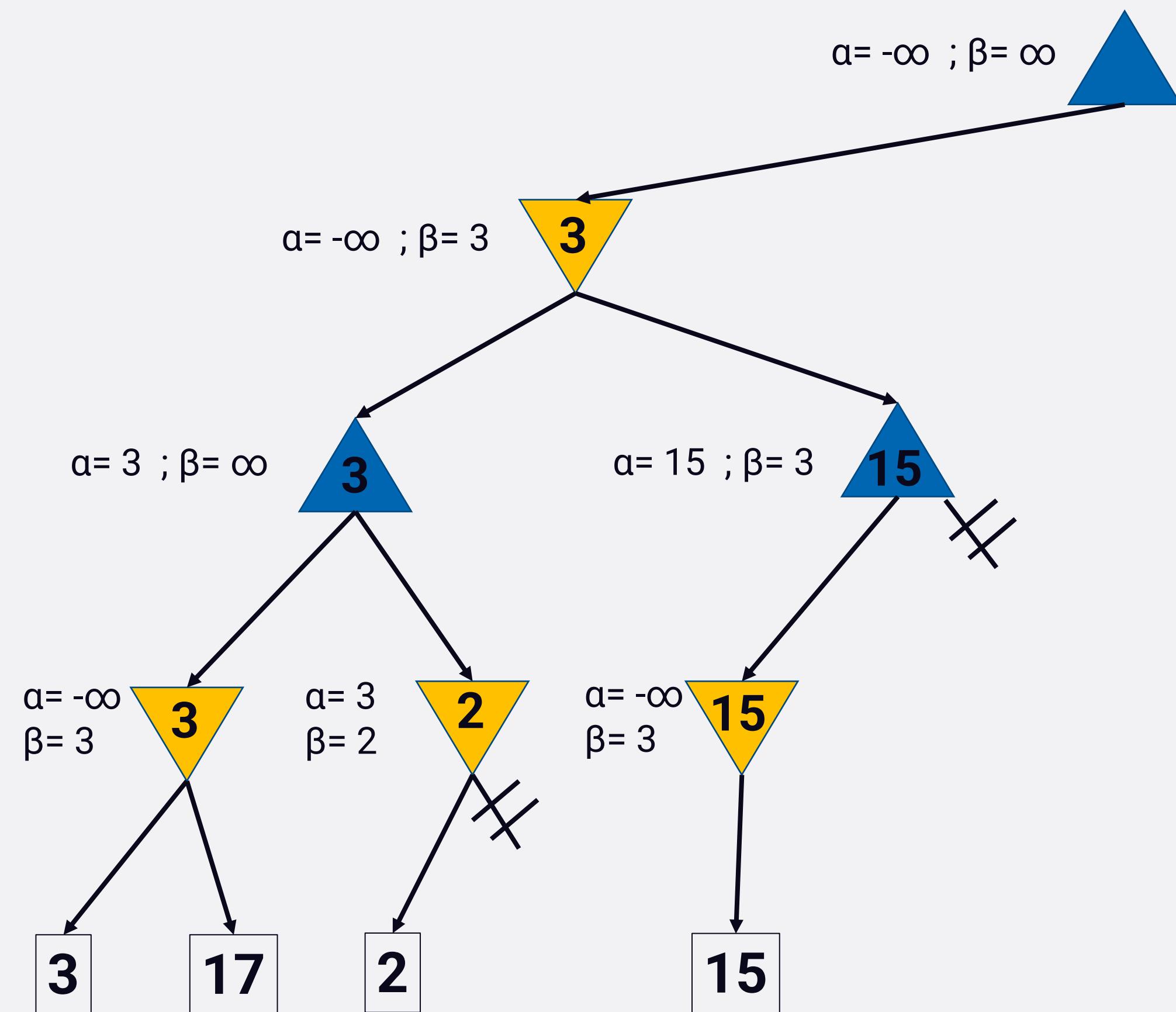
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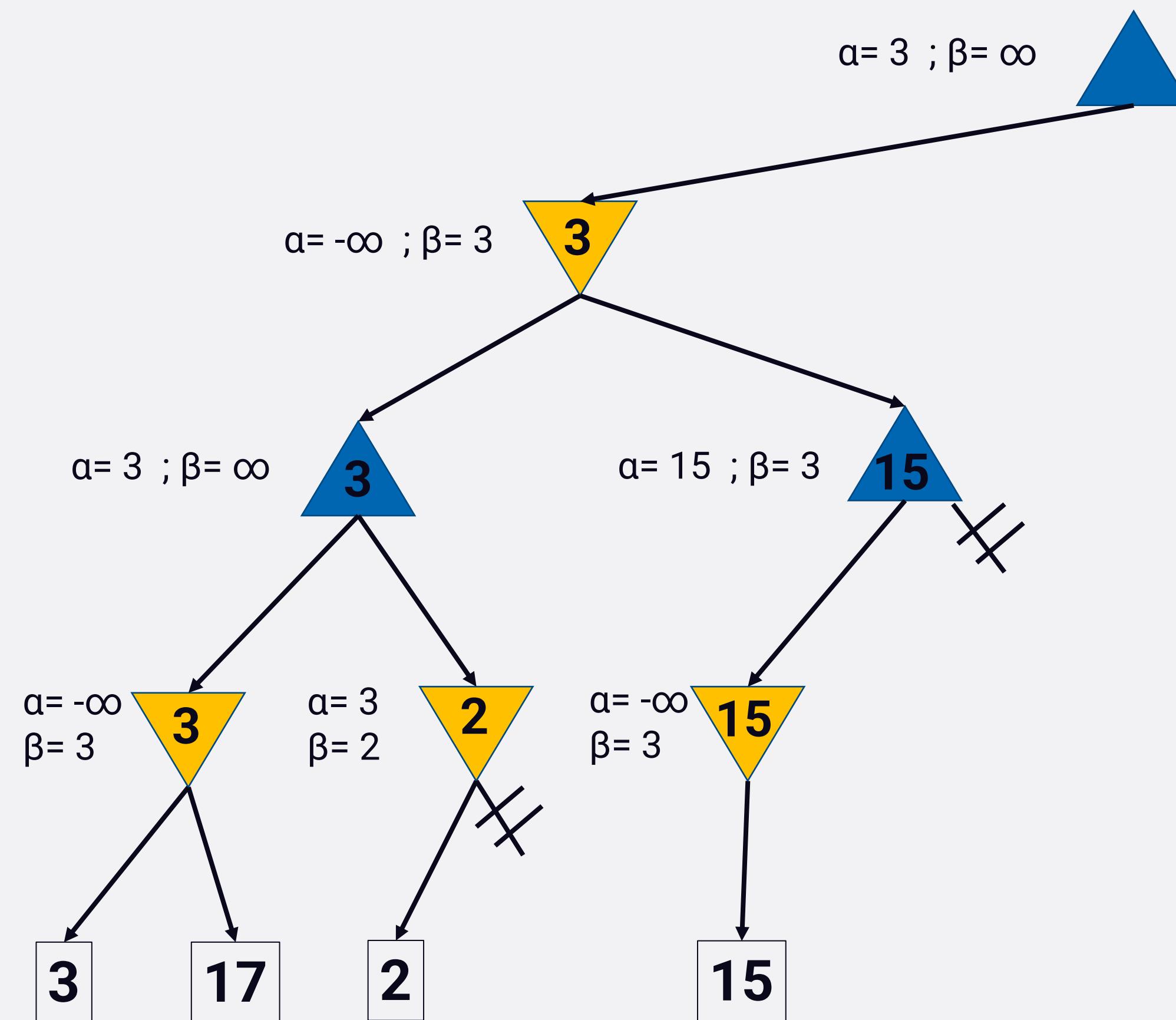
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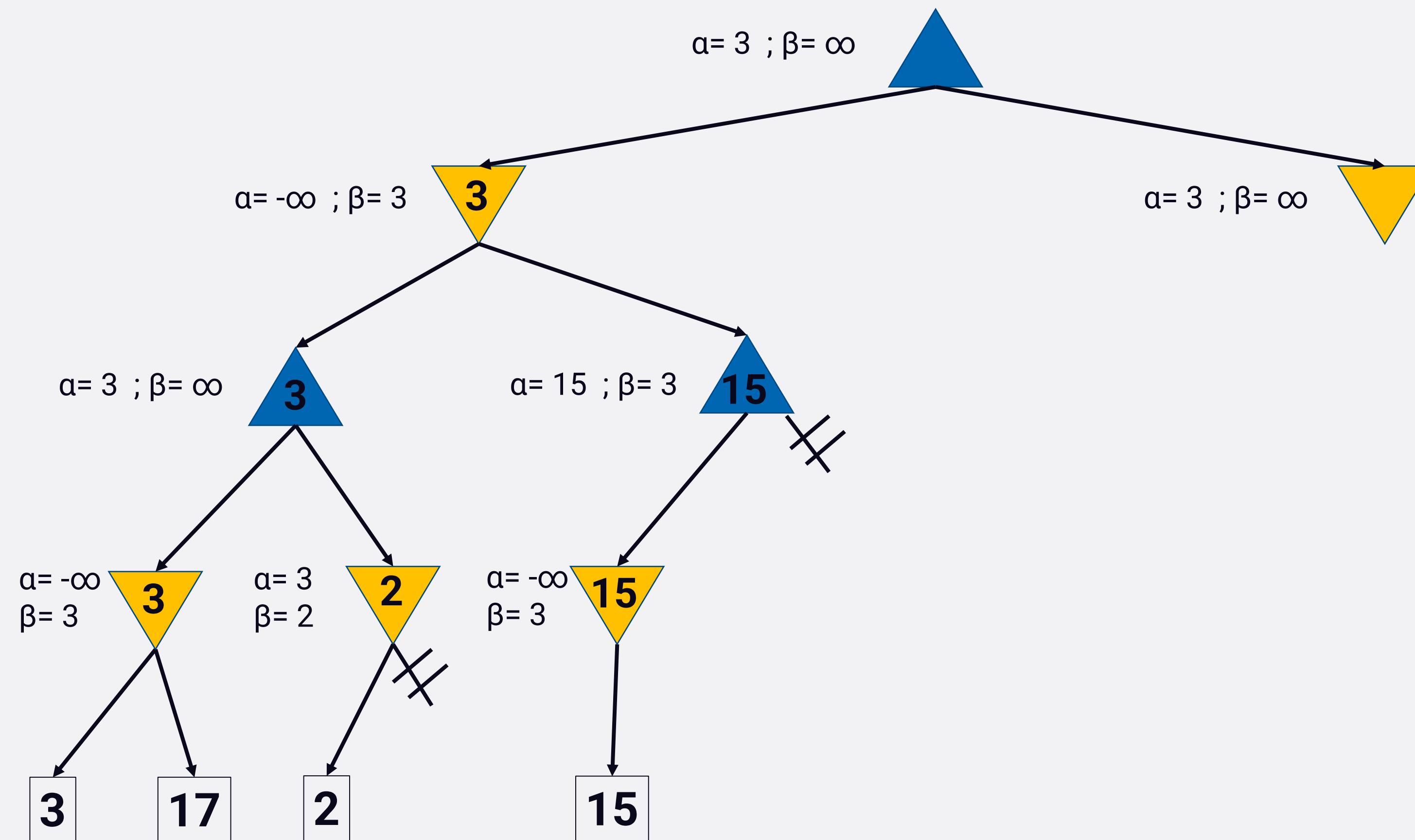
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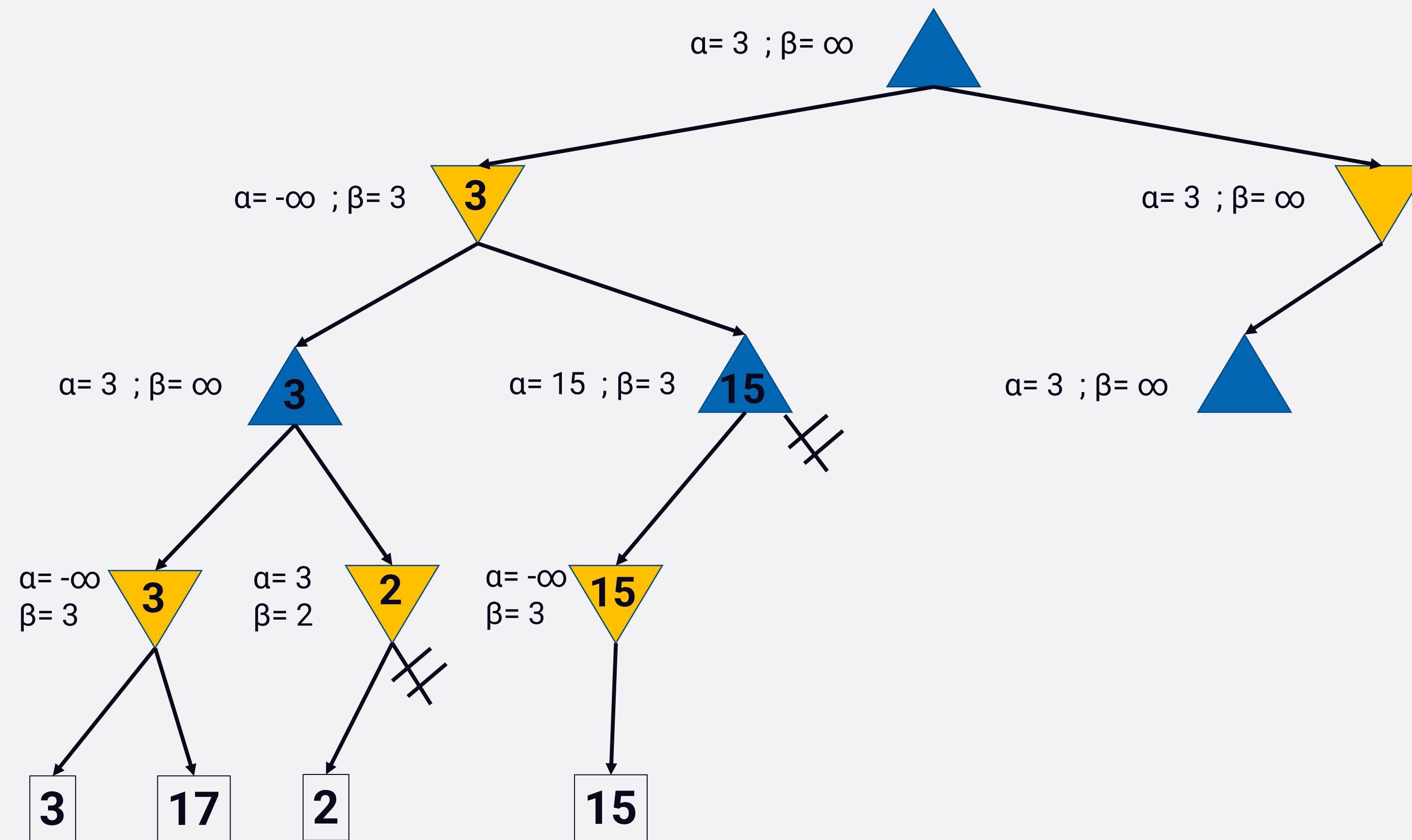
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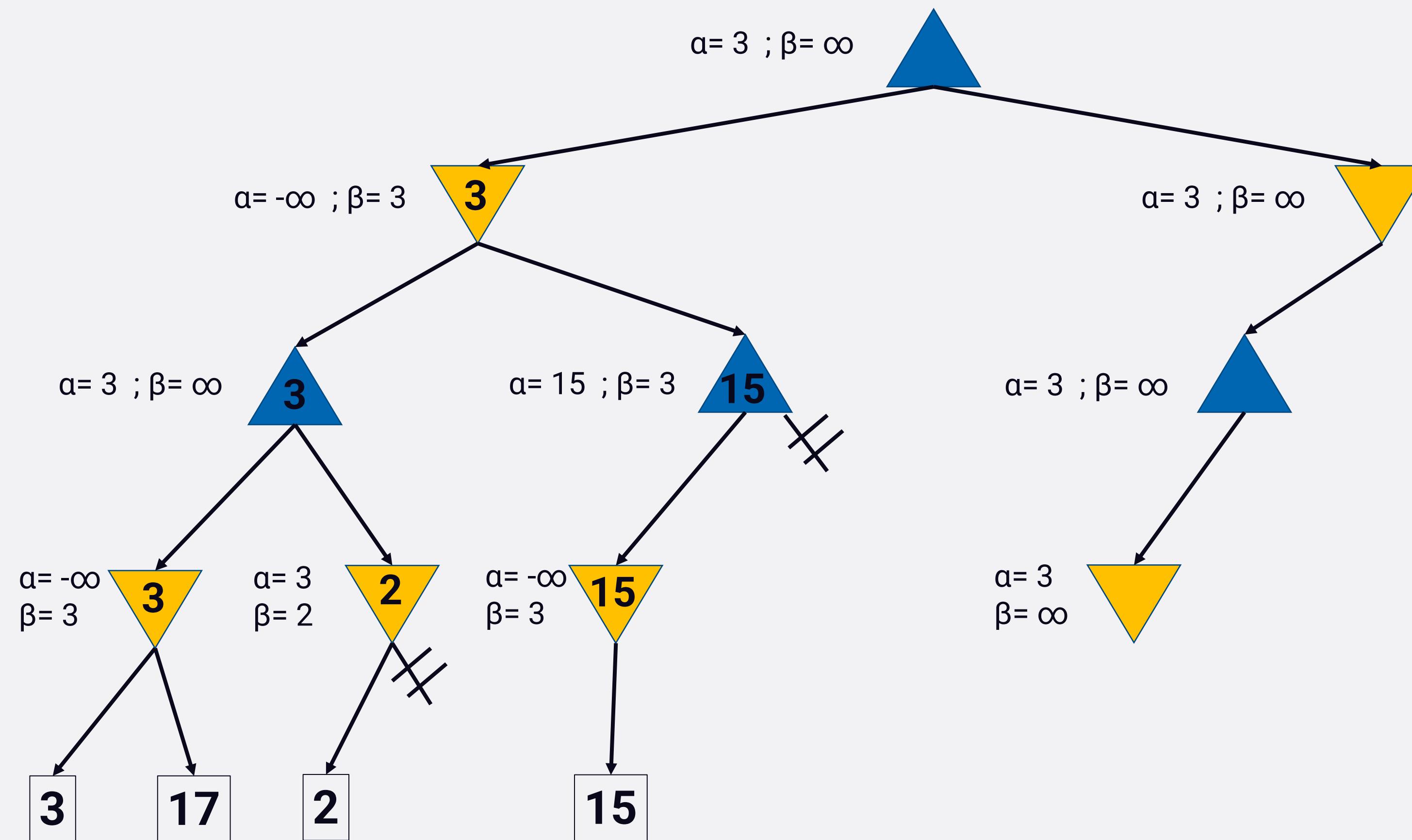
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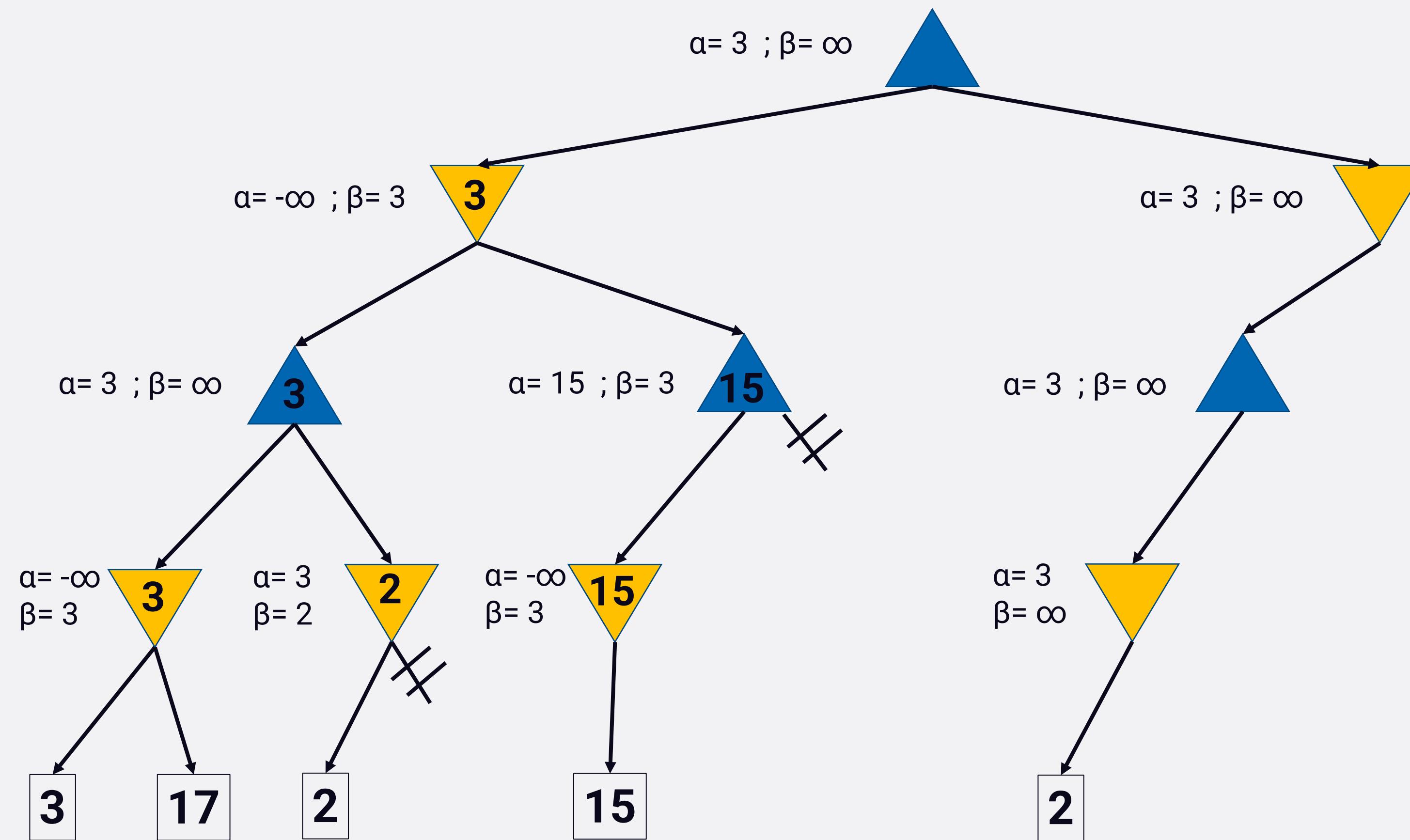
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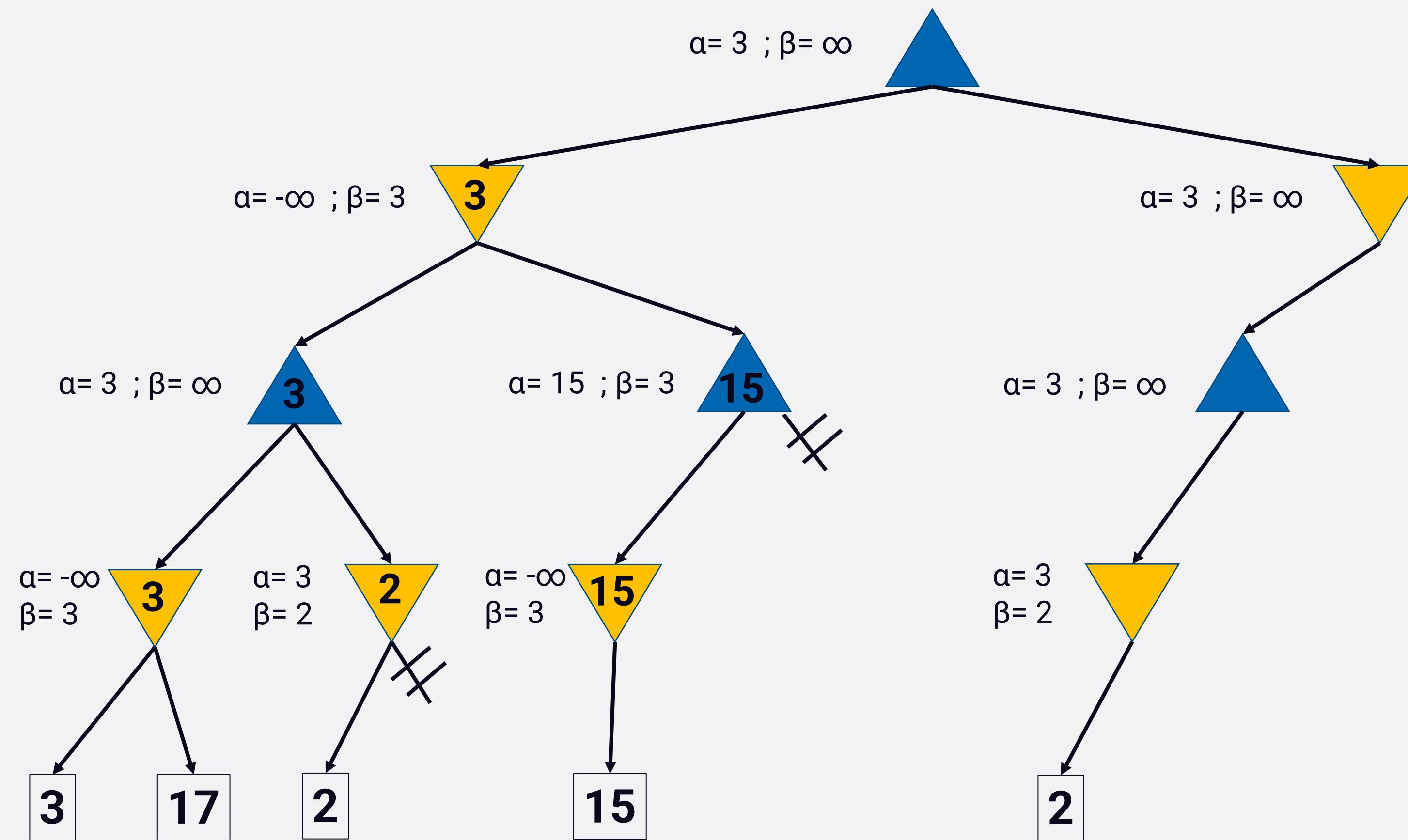
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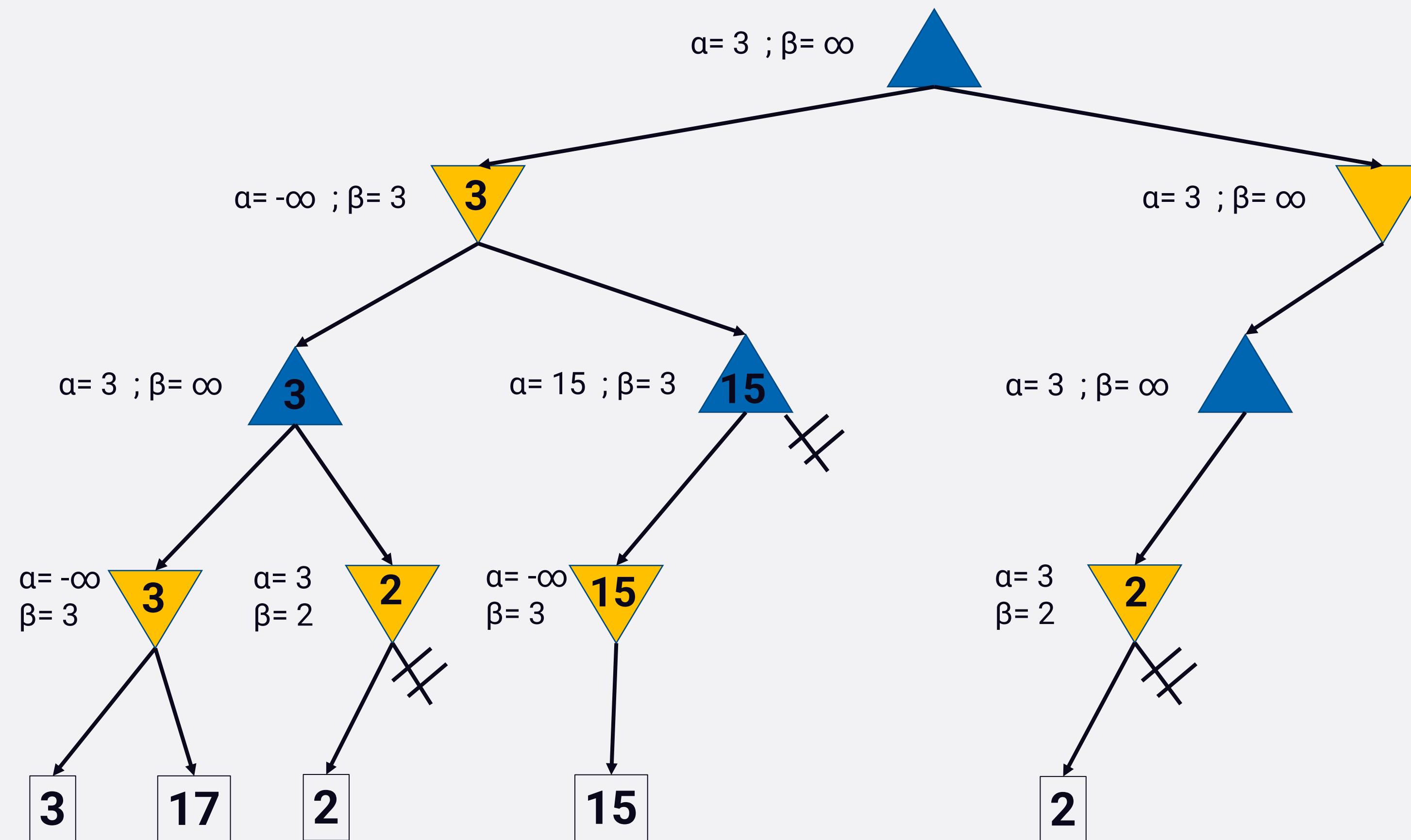
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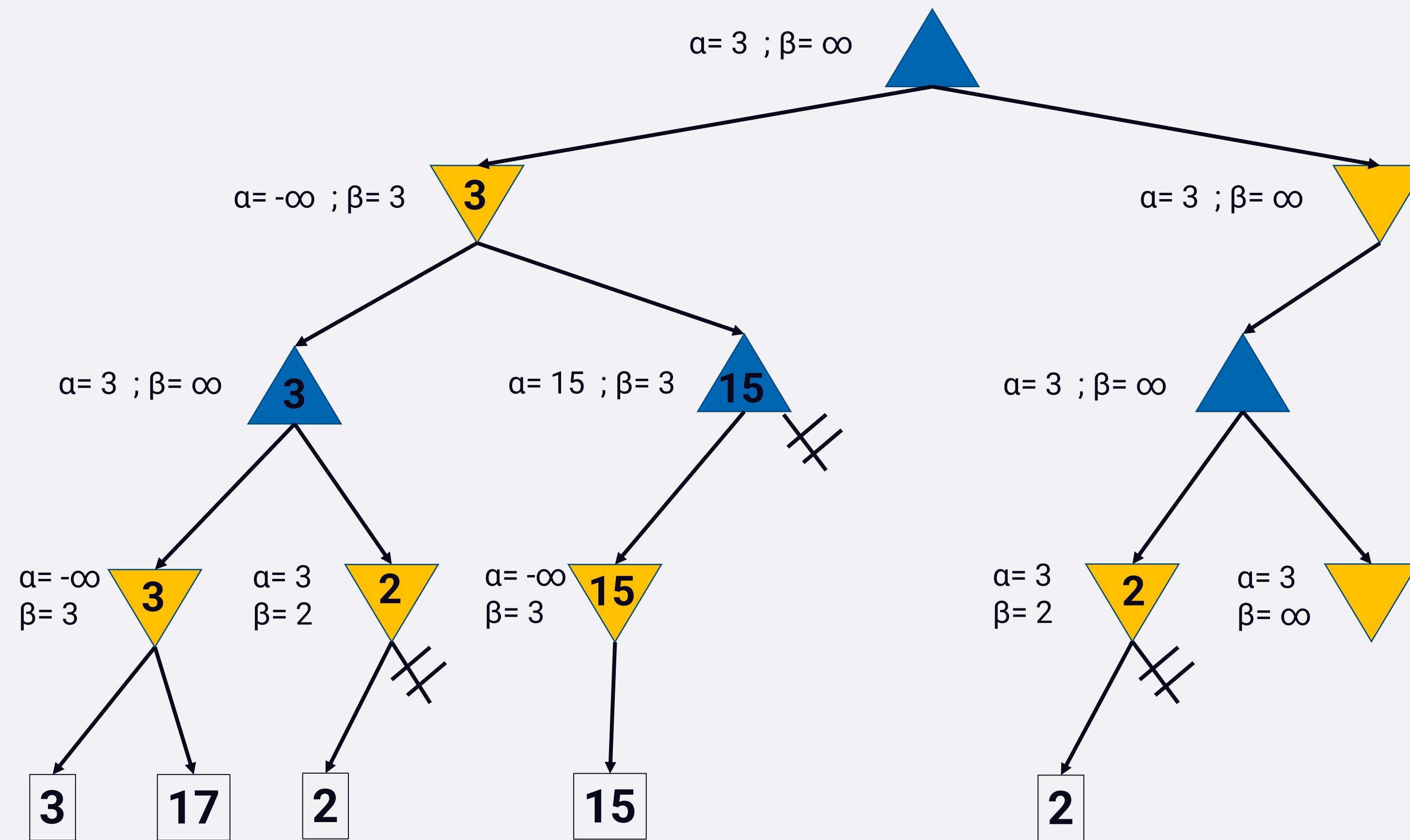
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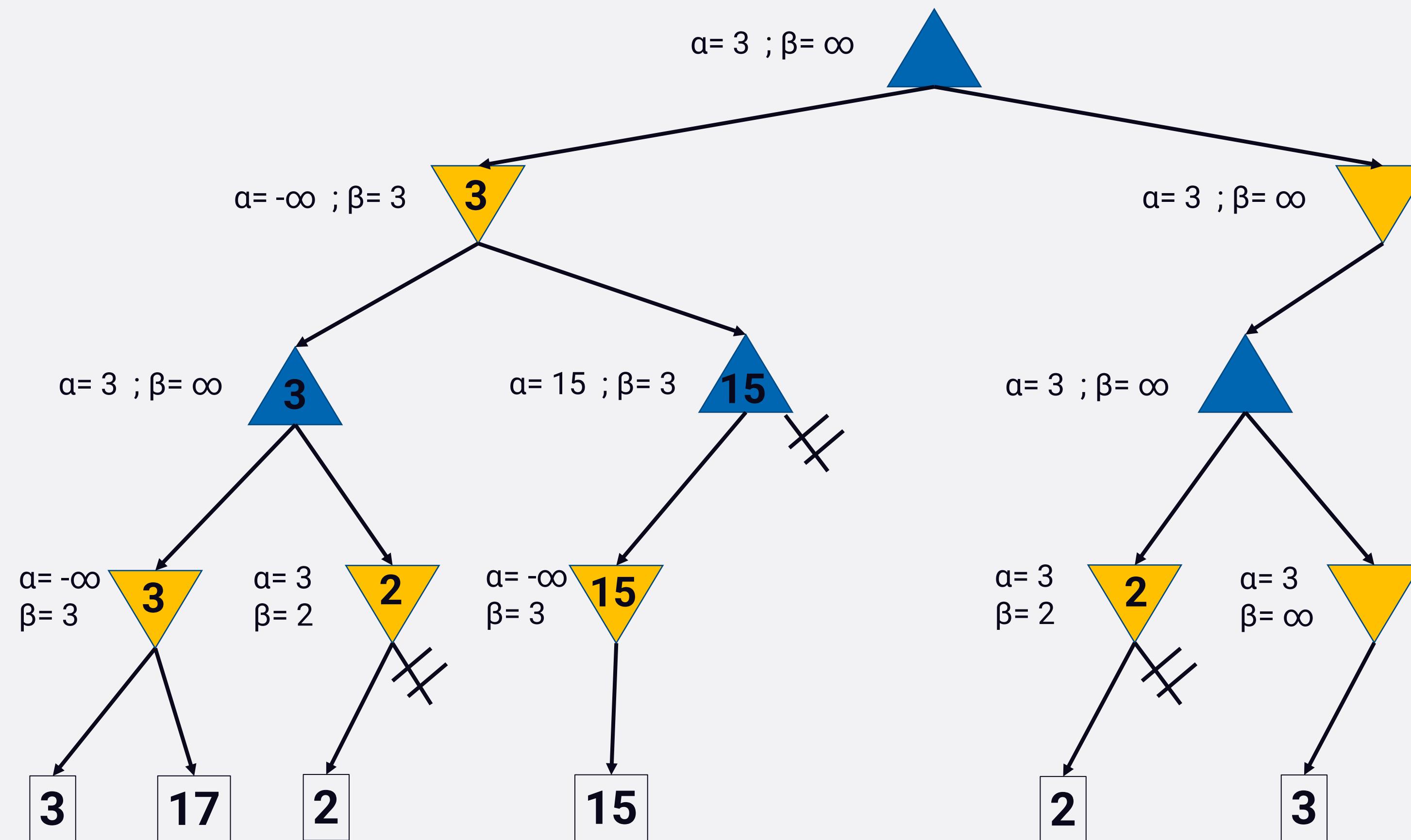
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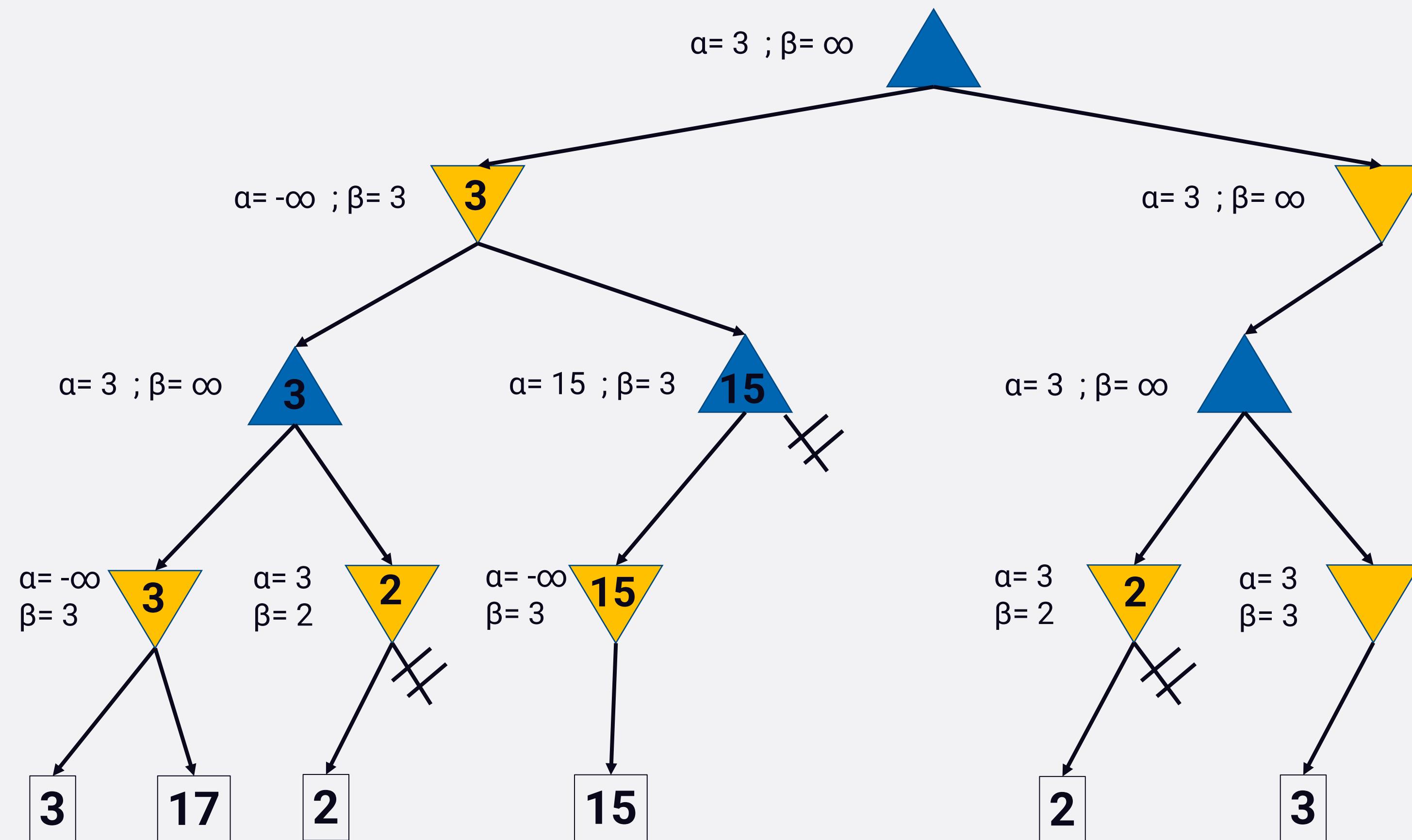
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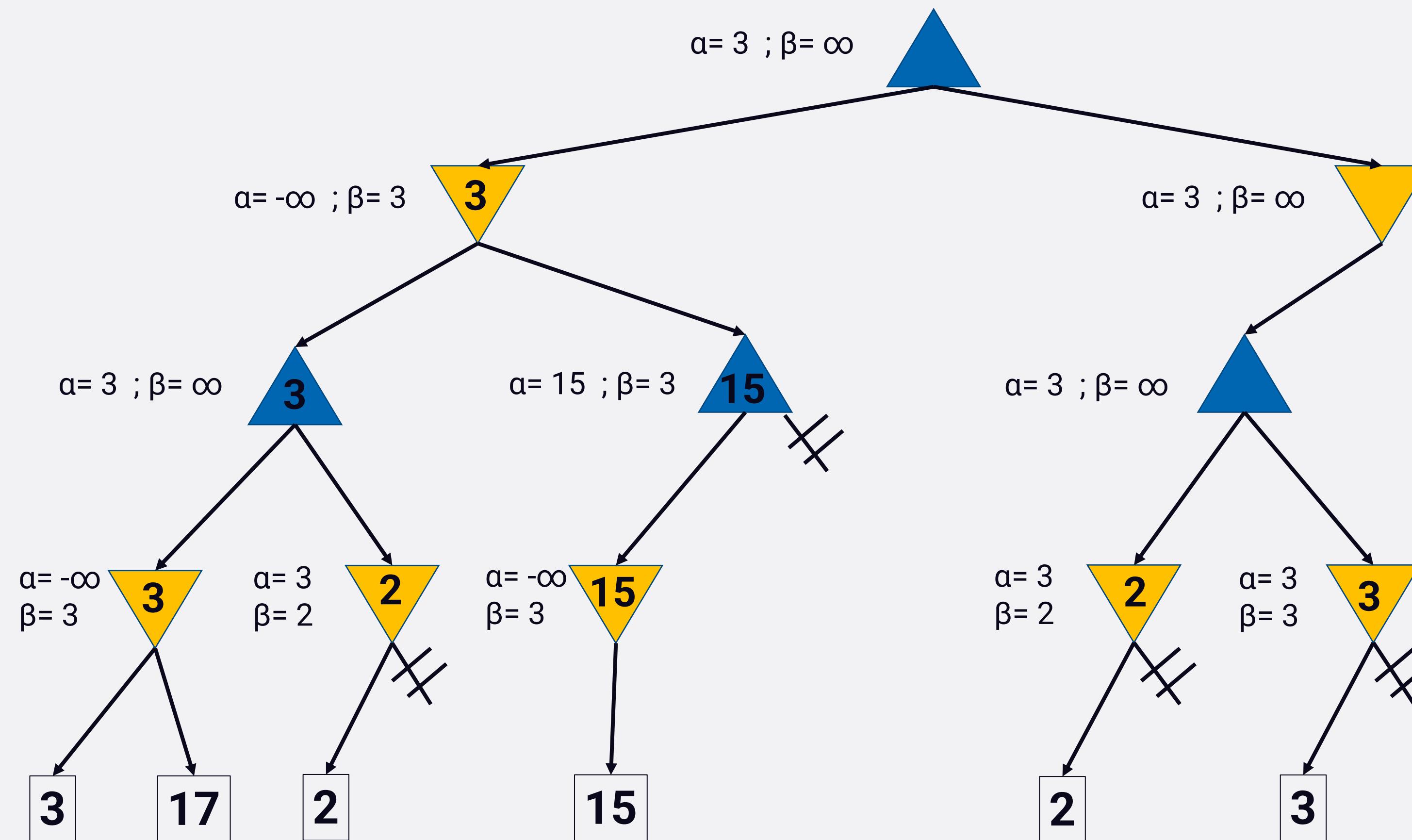
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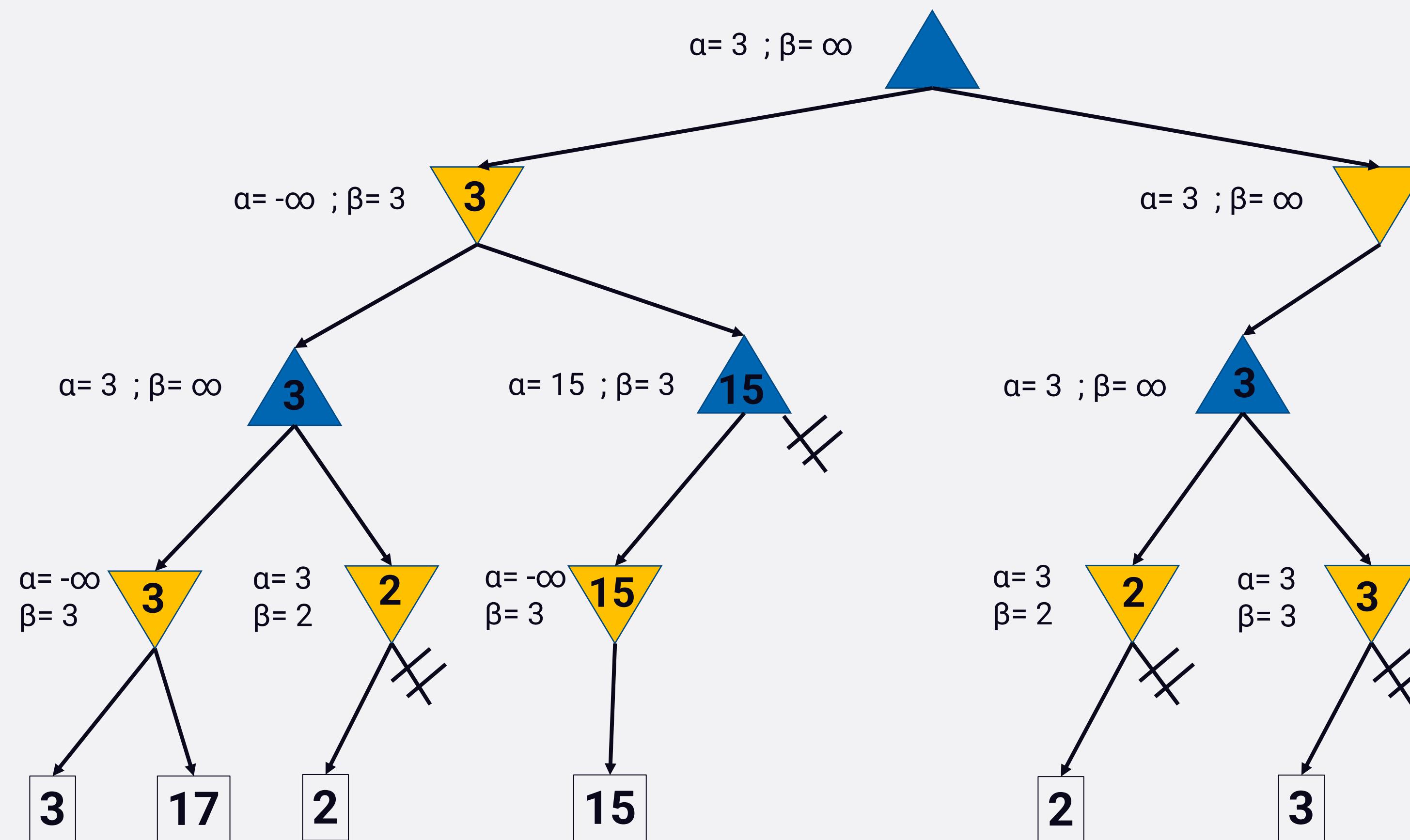
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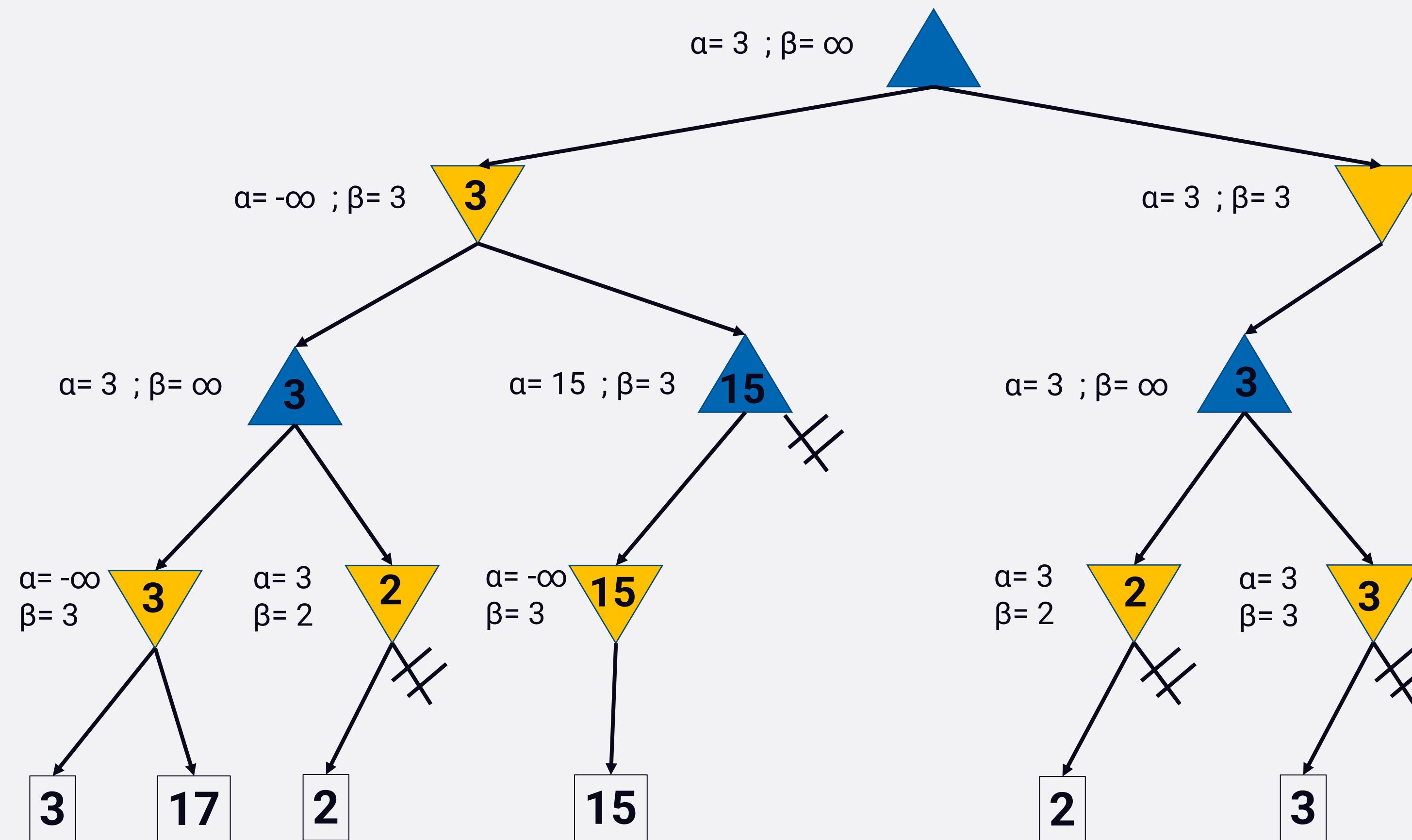
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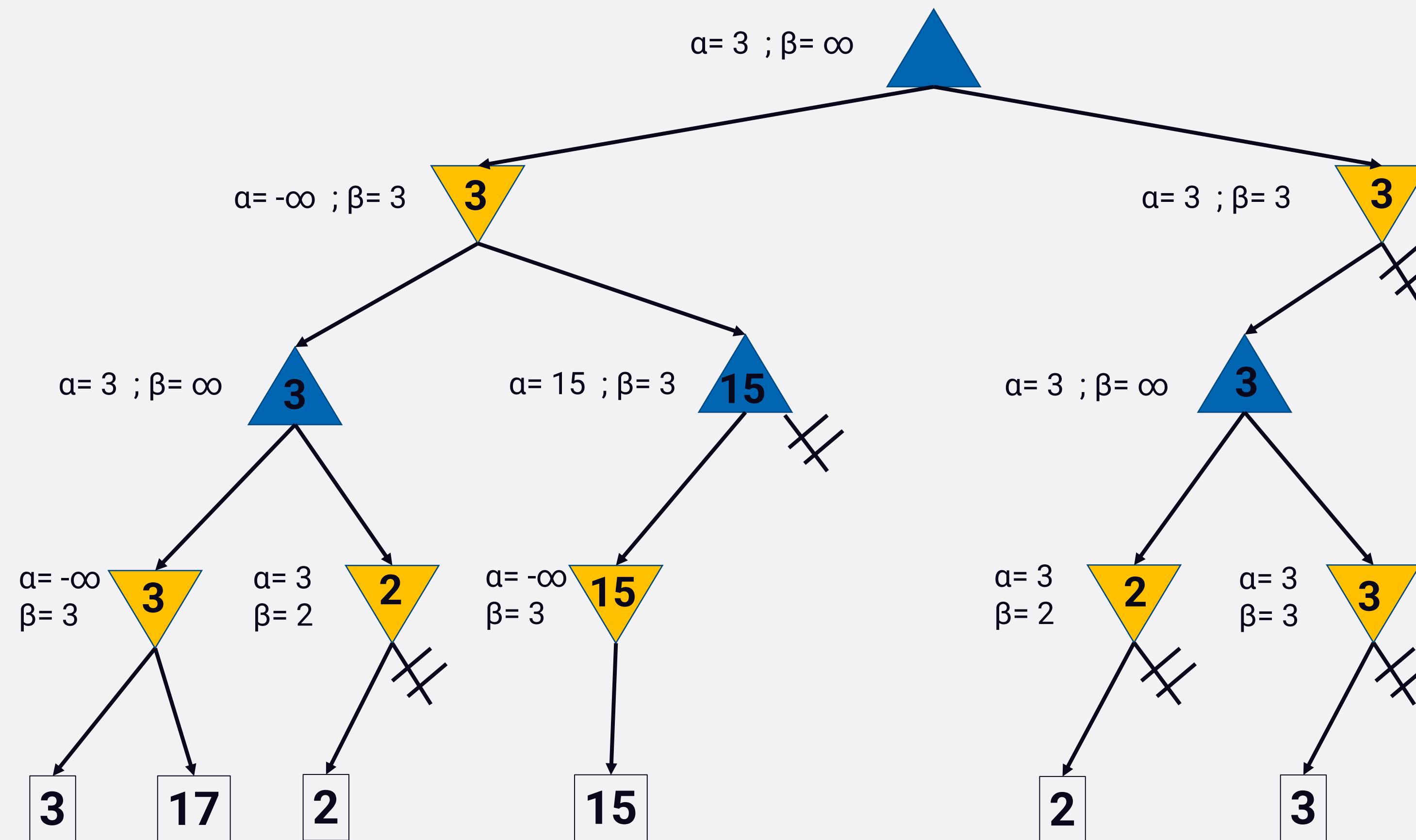
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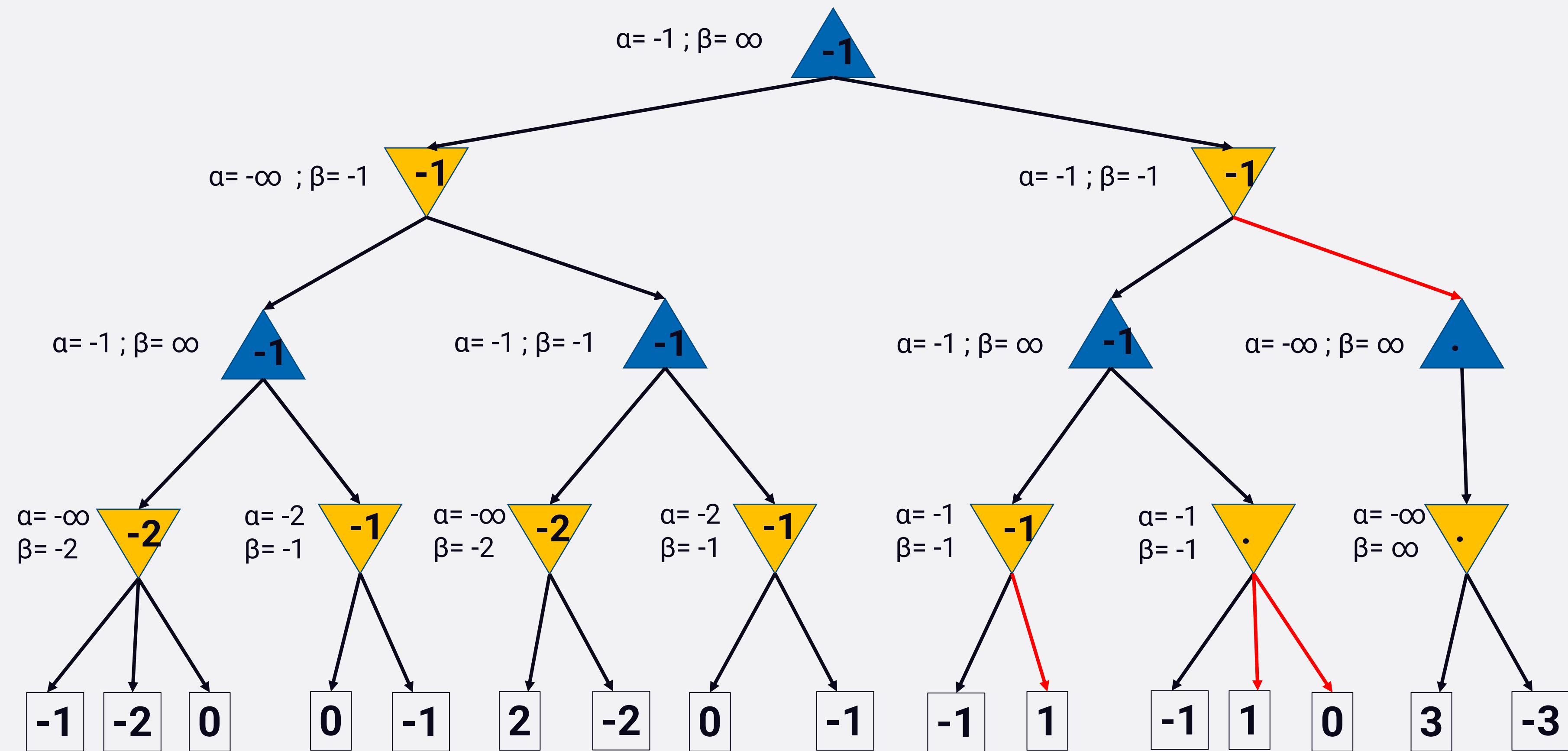


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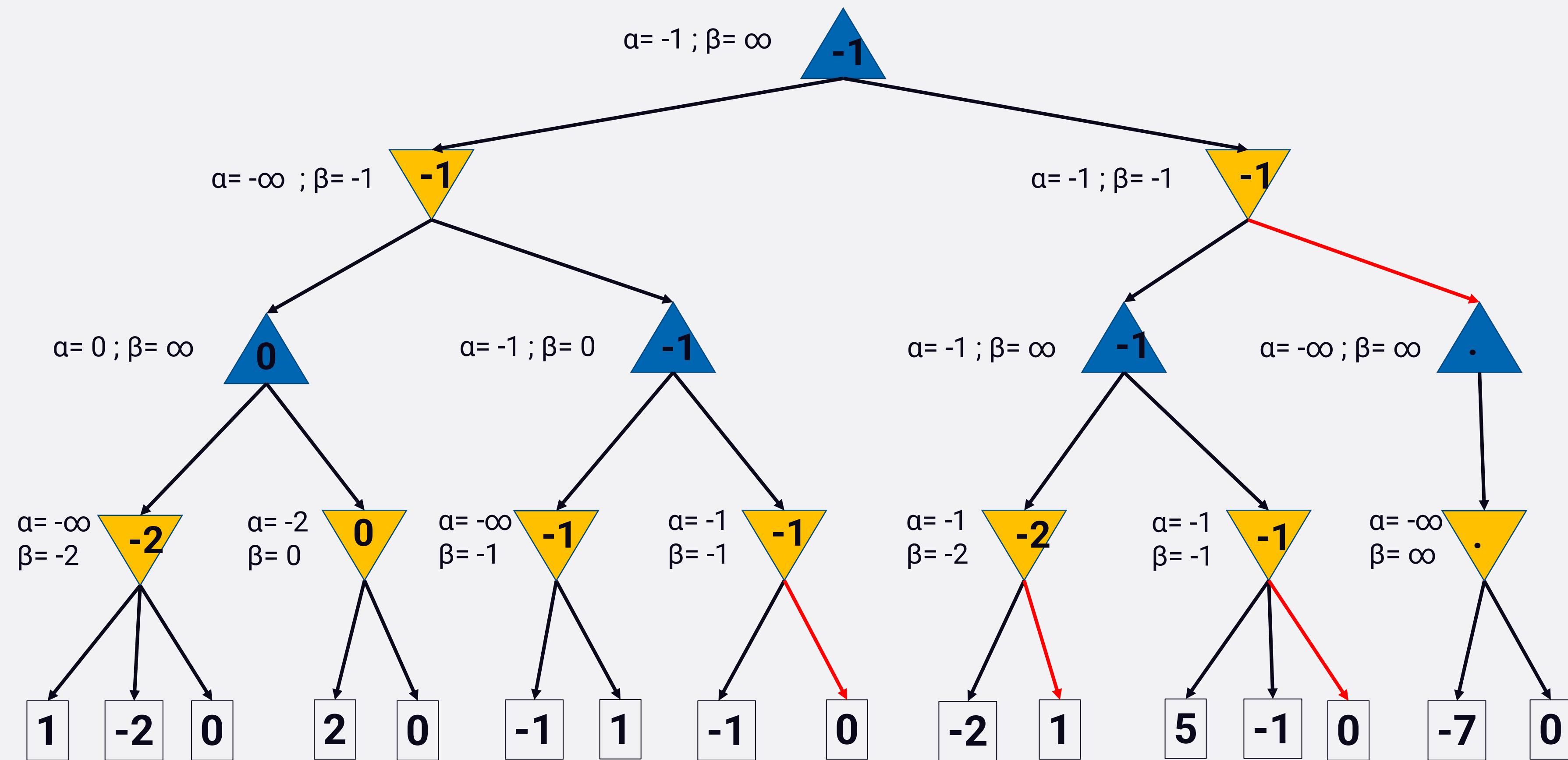
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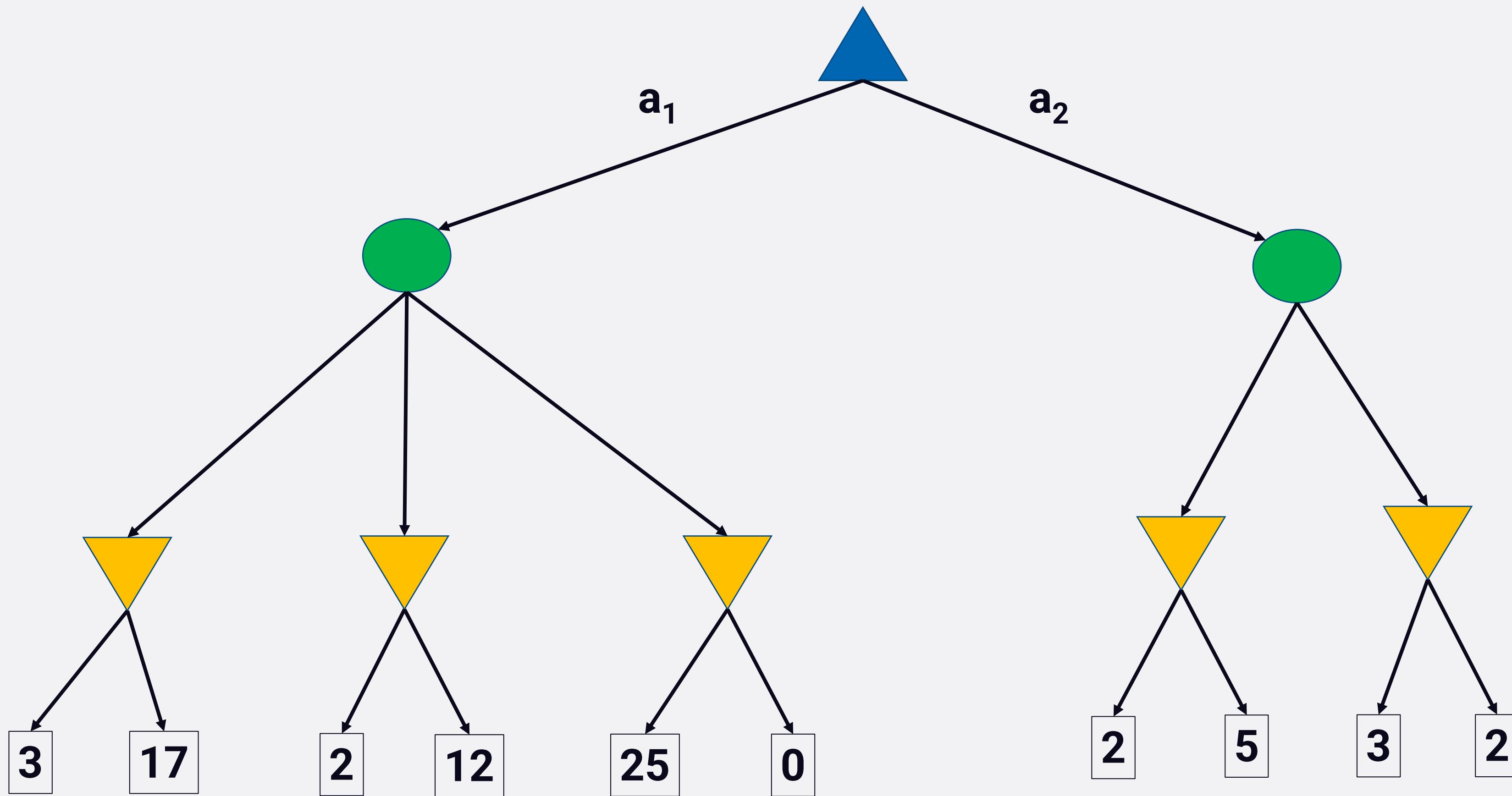


Exercise 6.3



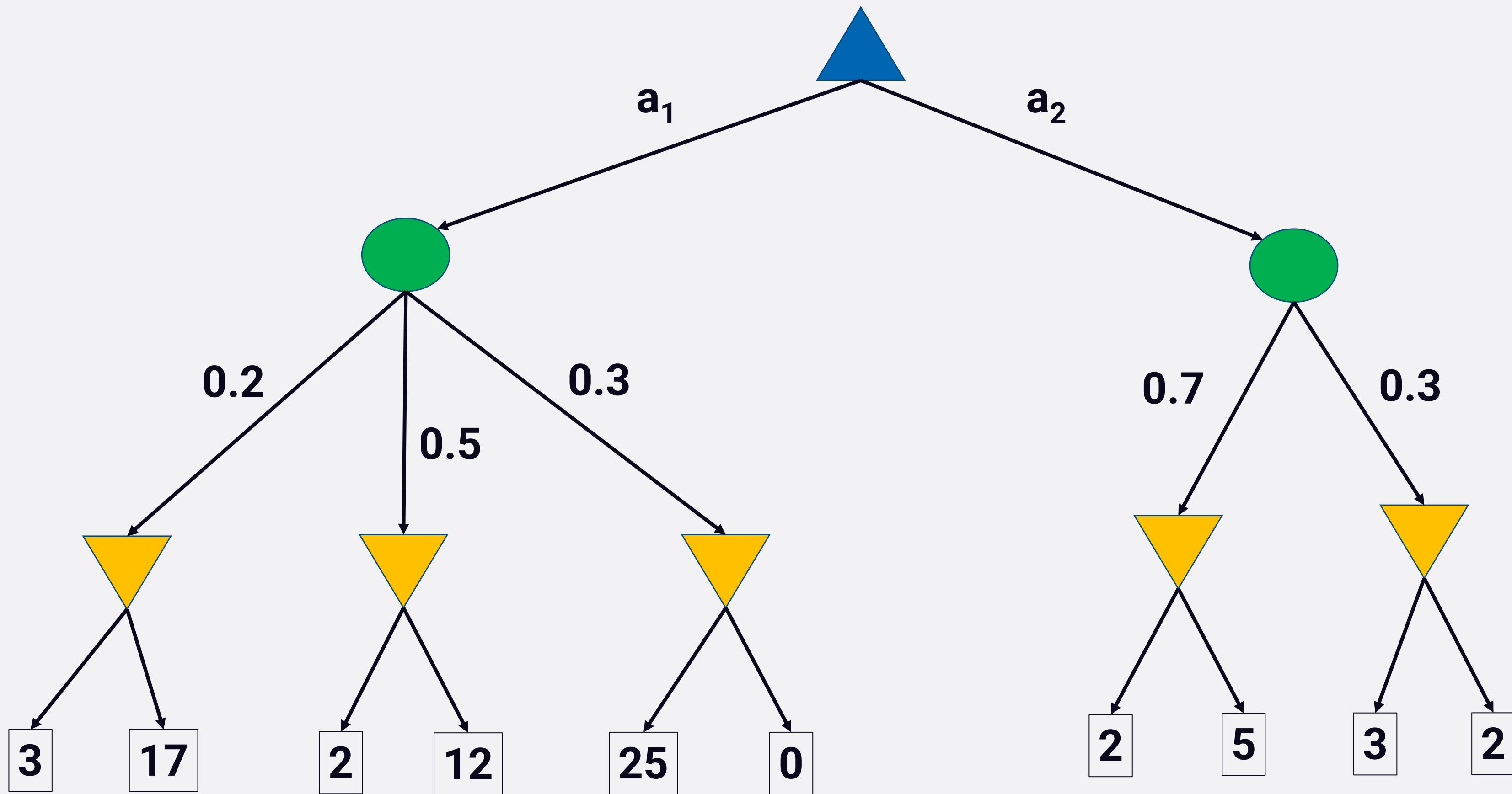
Exercise 6.3

- Expectiminimax



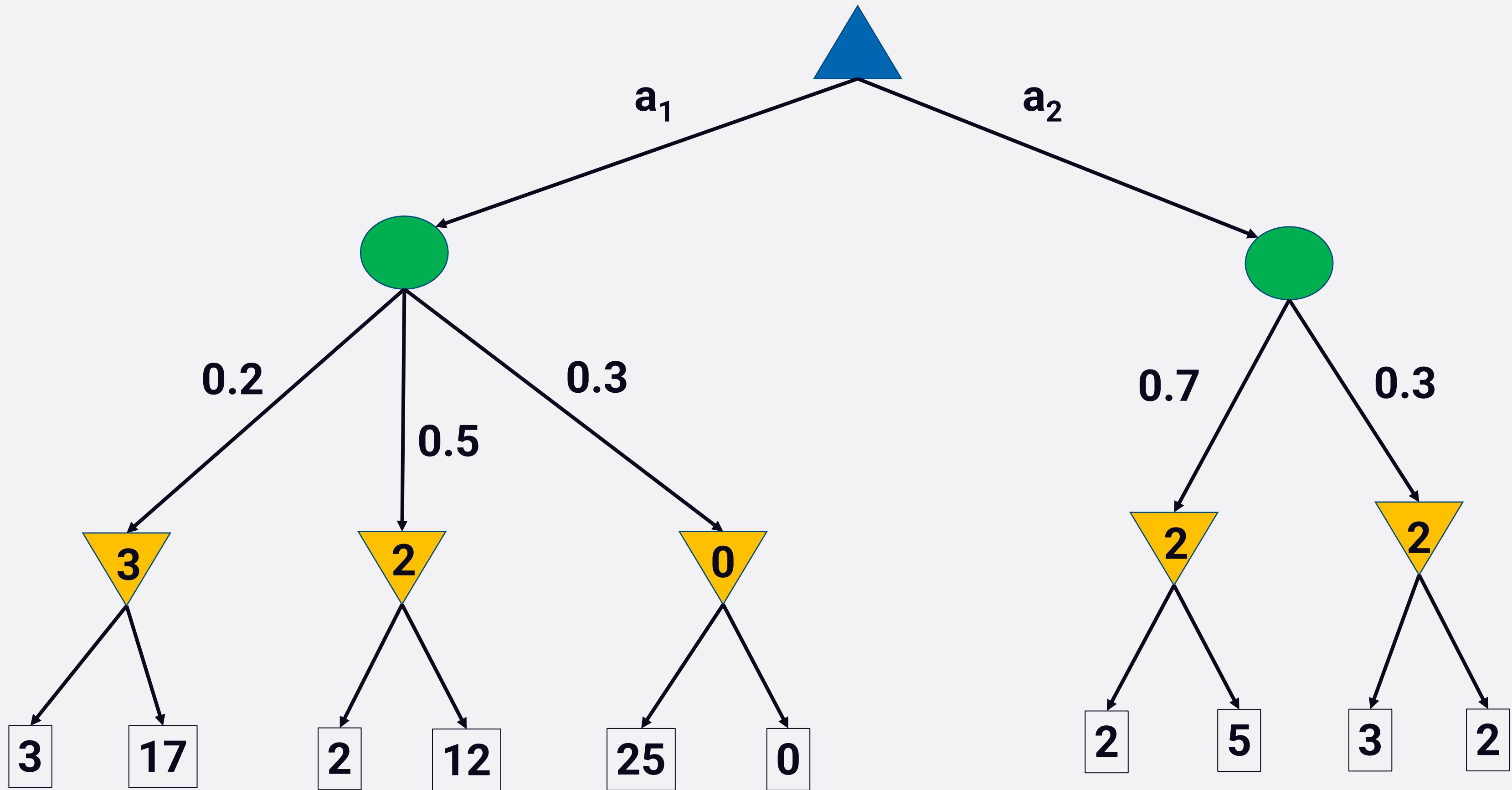
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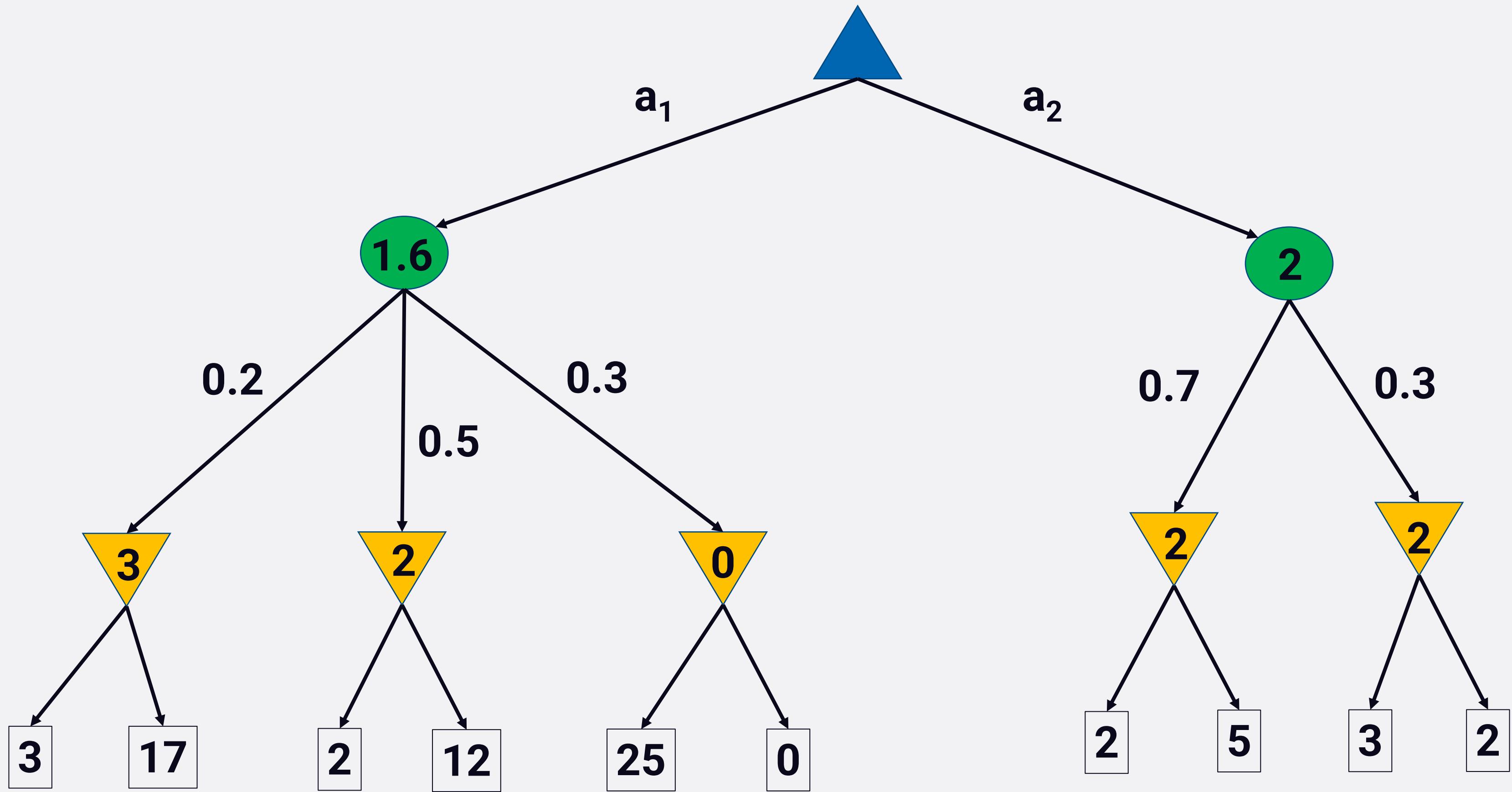
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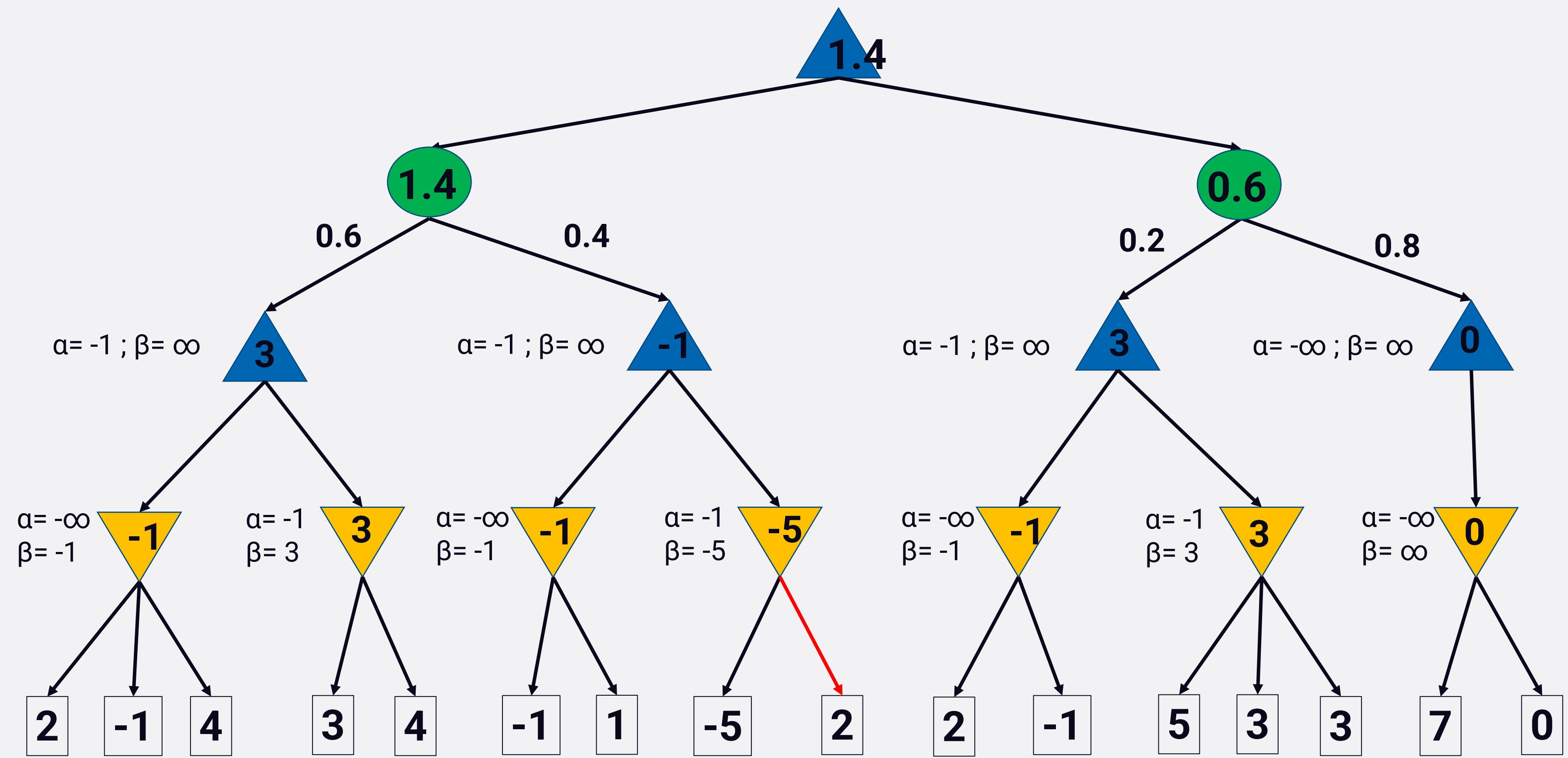


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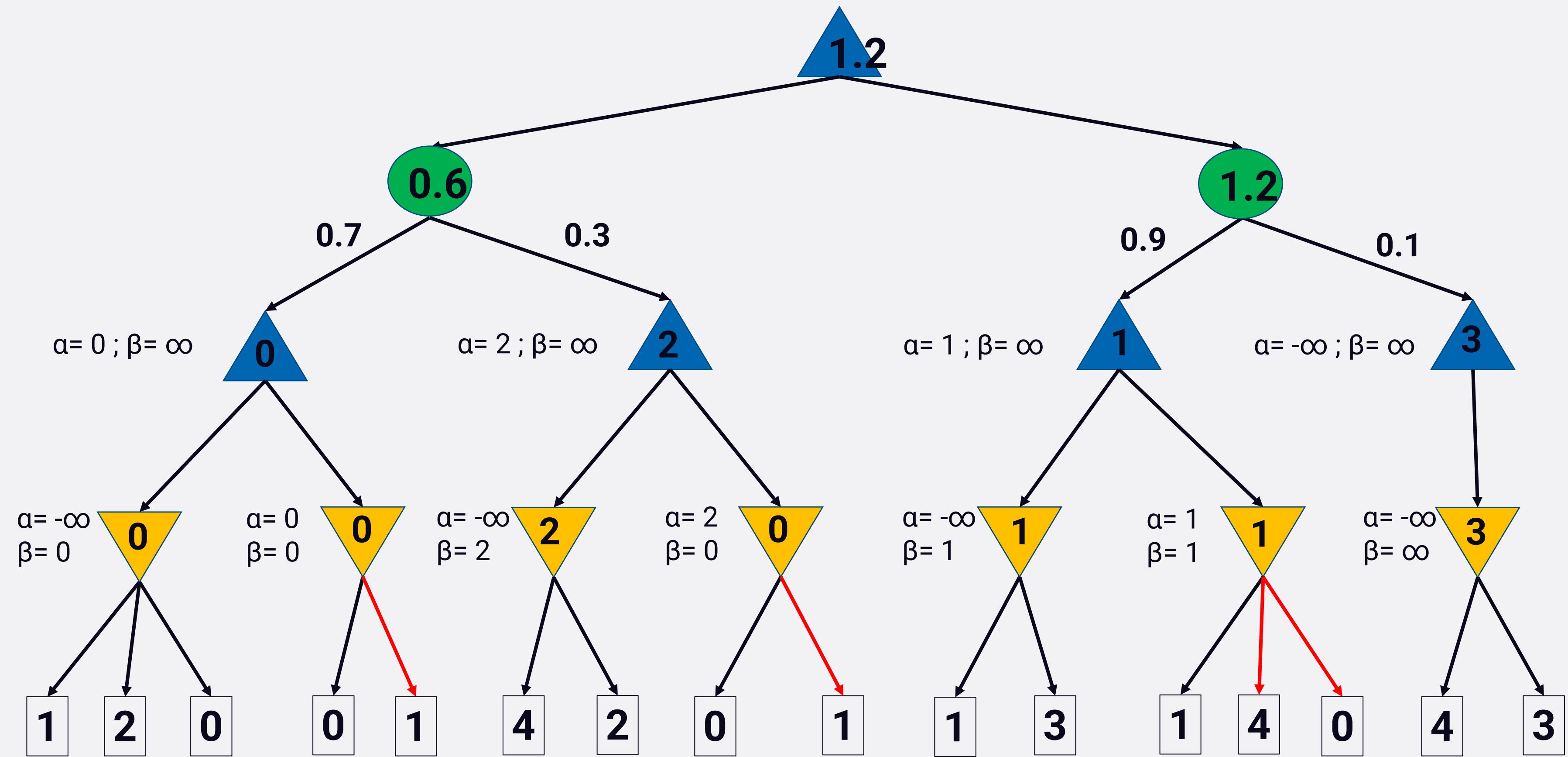
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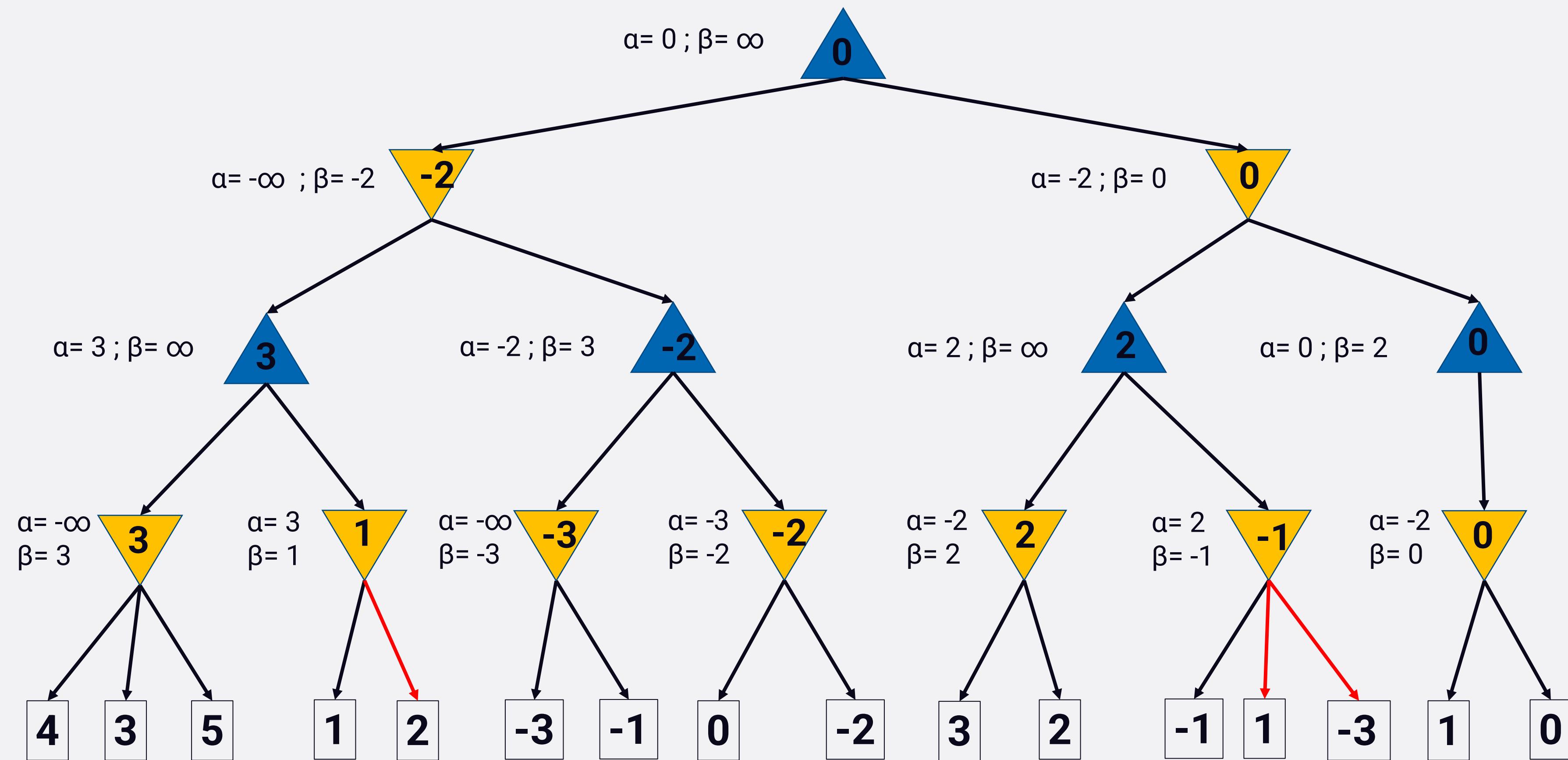
Exercise 6.4



Exercise 6.5



Exercise 6.6



Exercise 6.7

