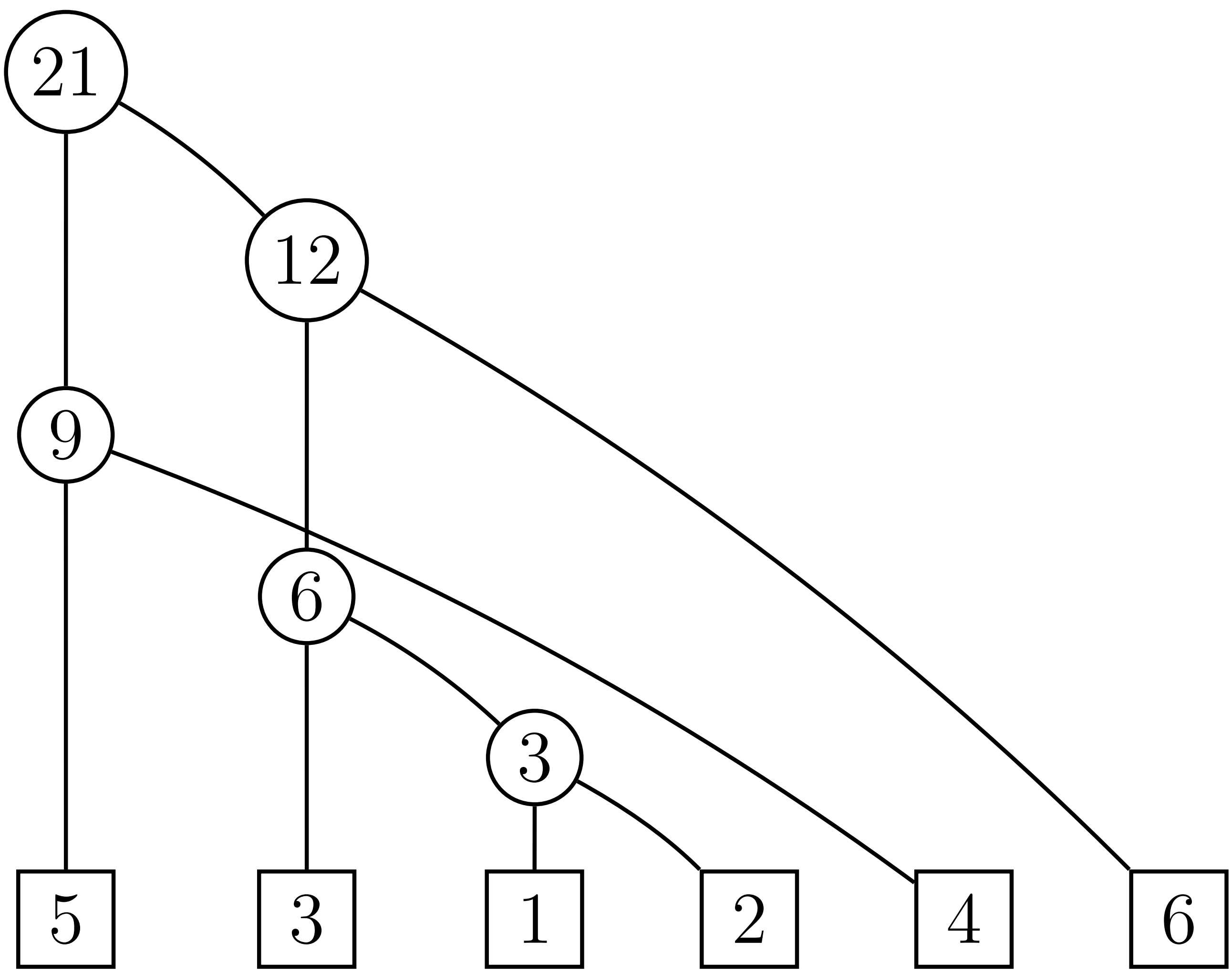
Hu - Tucker

- A node is a □ or a ○
- Two nodes are compatible if there is no □ between them
- A weight sequence is a sequence of nodes with weight
- Weight of a father is the sum of the two sons' weights
- Position of a father is the position of the left son
- Given two adjacent nodes of equal weights, the left is considered less

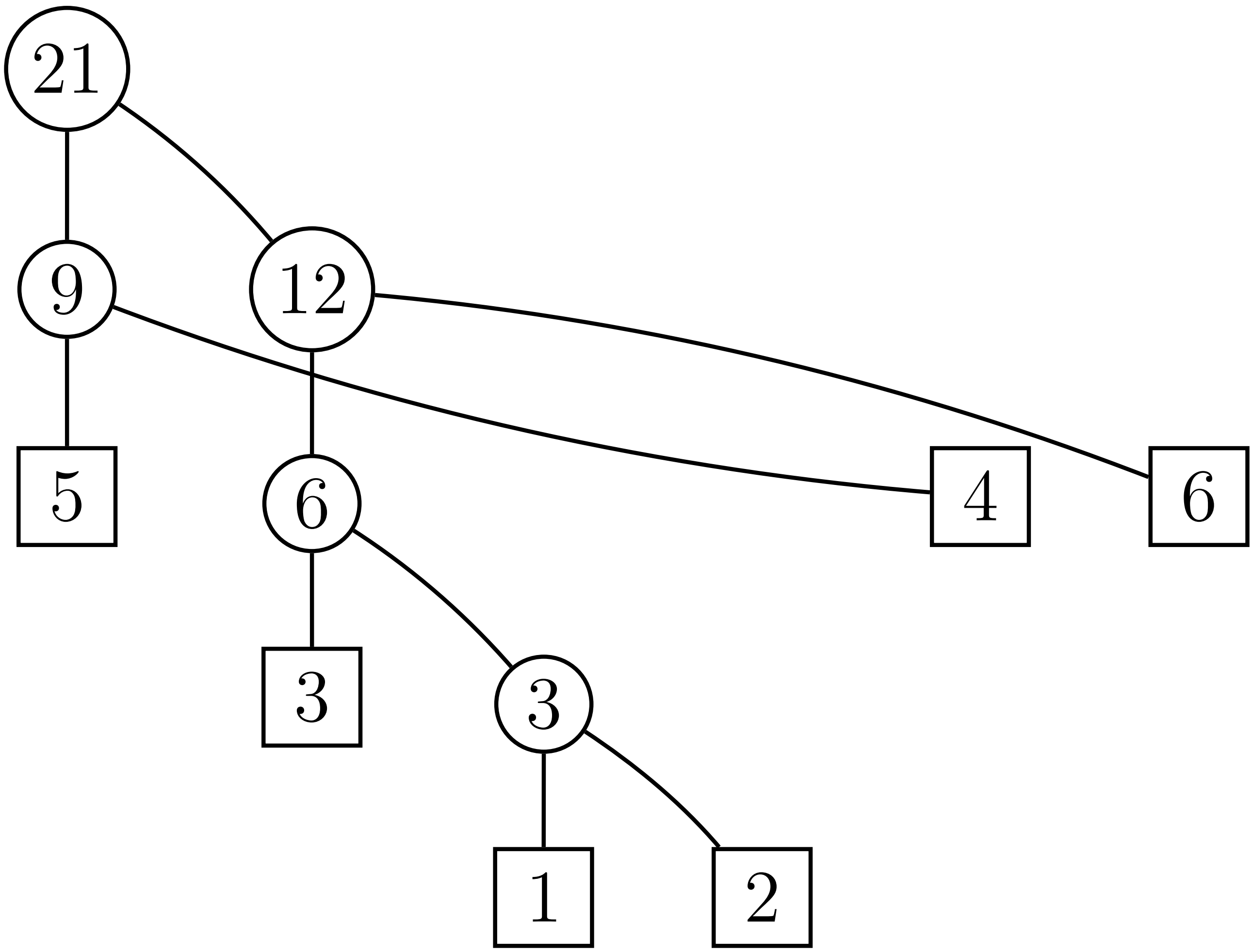
Step I: Combination

Combine the min weight compatible pair until there is a tree T'



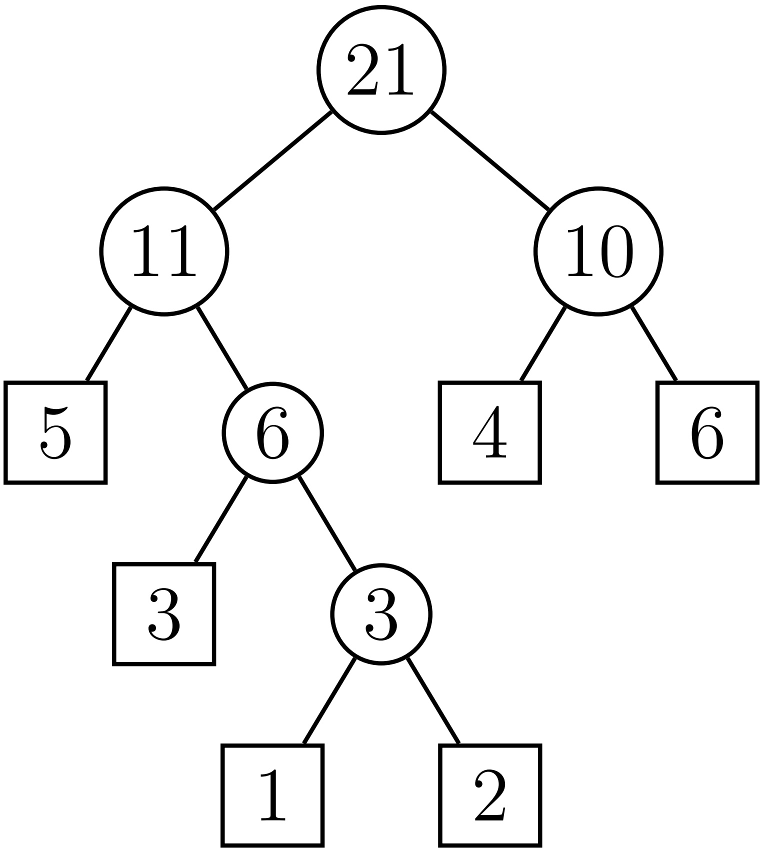
Hu - Tucker

Step II: Get levels of □ in T'

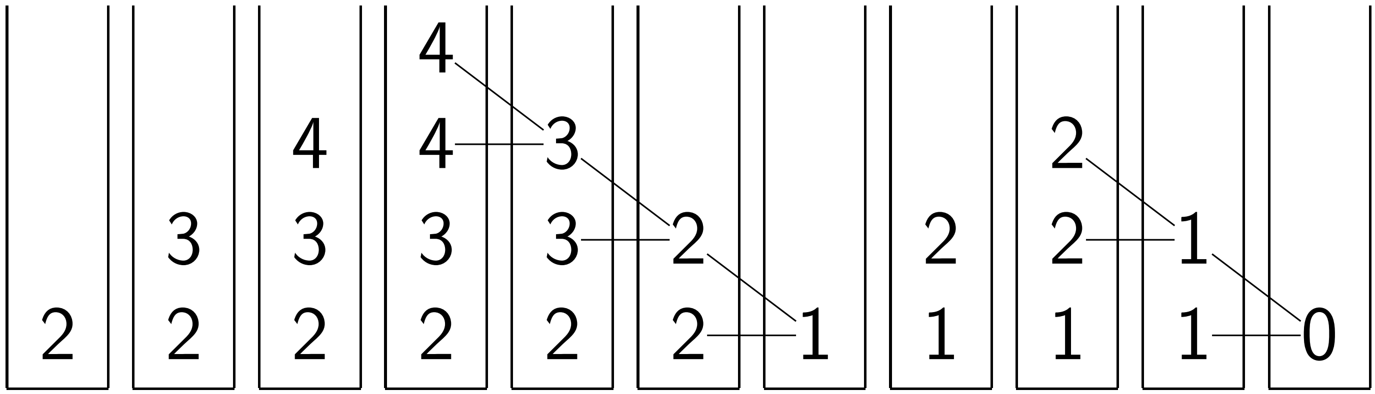


2 3 4 4 2 2

Step III: Reconstruction



Read the levels from left to right. Use a stack. $2, 3, 4, 4, 2, 2$



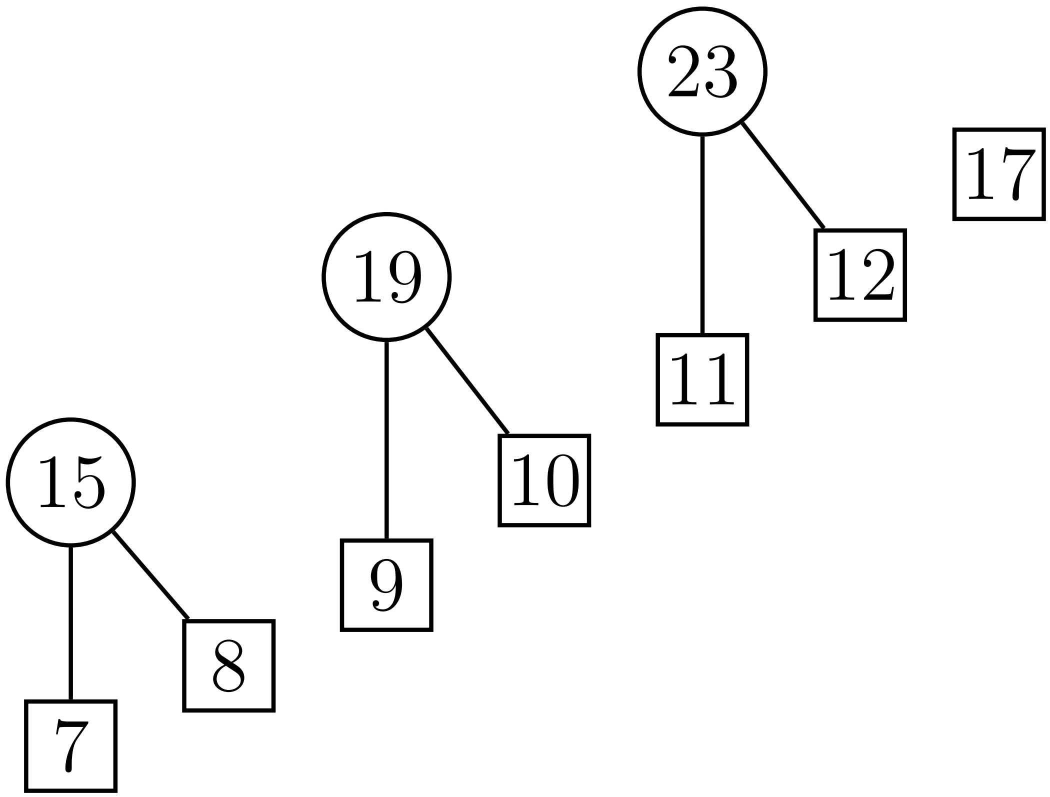
Step I: Combination

Instead of min weight compatible pair, use a local min weight compatible pair in a weight sequence.

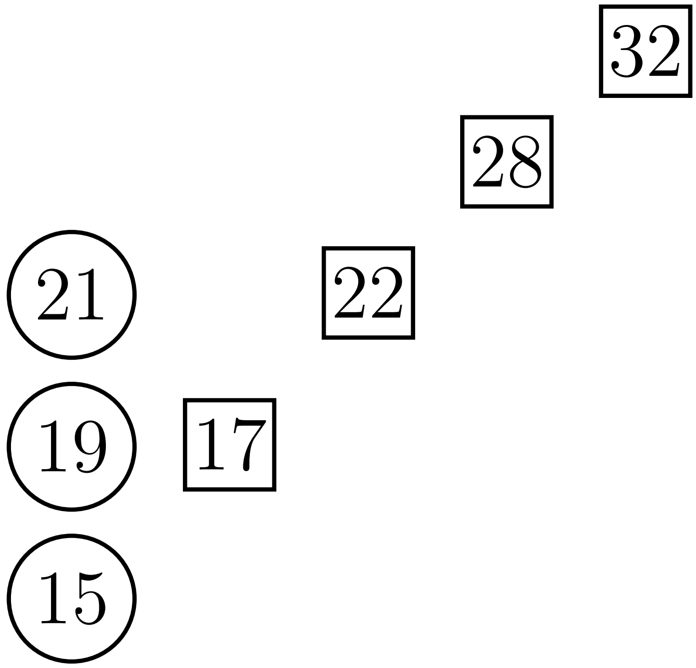
$$\boxed{a}, \boxed{b}, \boxed{c}, \boxed{d}$$

If $\boxed{a} > \boxed{c}$ and $\boxed{b} < \boxed{d}$, then $\boxed{b}$ and $\boxed{c}$ is a local minimum.

Cost of a tree from a set $\leq$ cost of a tree from a sequence.



Hu - Tucker



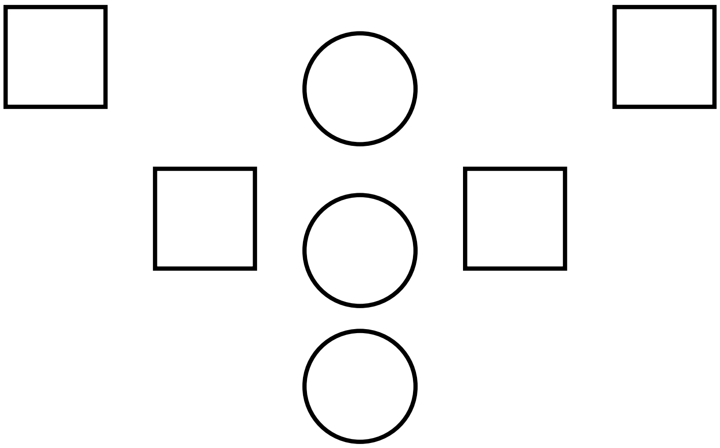
Two circle at the bottom

One circle and one square

Two squares on the slope

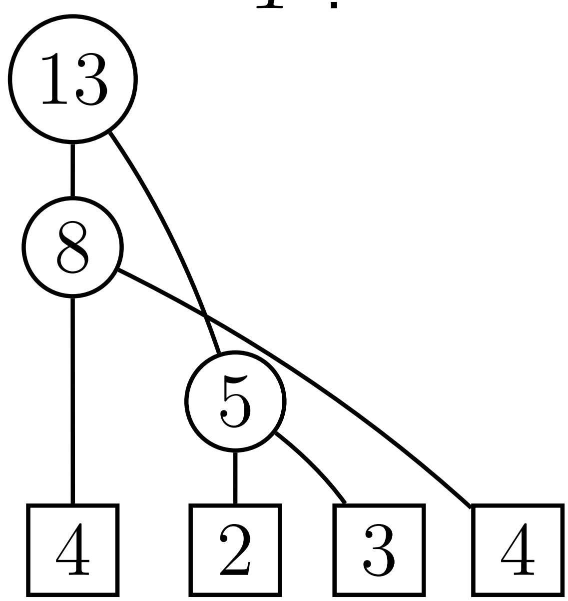
For an increasing weight sequence, Huffman $=$ Hu-Tucker, so the tree T' is optimum.

For a valley sequence, the tree T' is optimum.

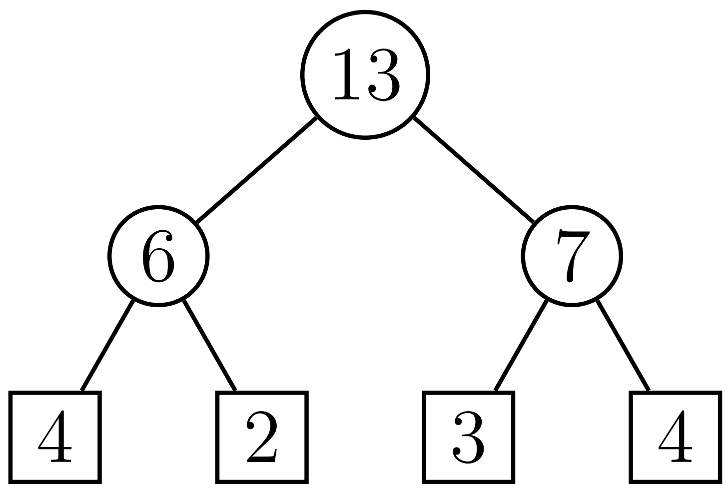


T' can be normalized.

T':



T_n:



Hu - Tucker