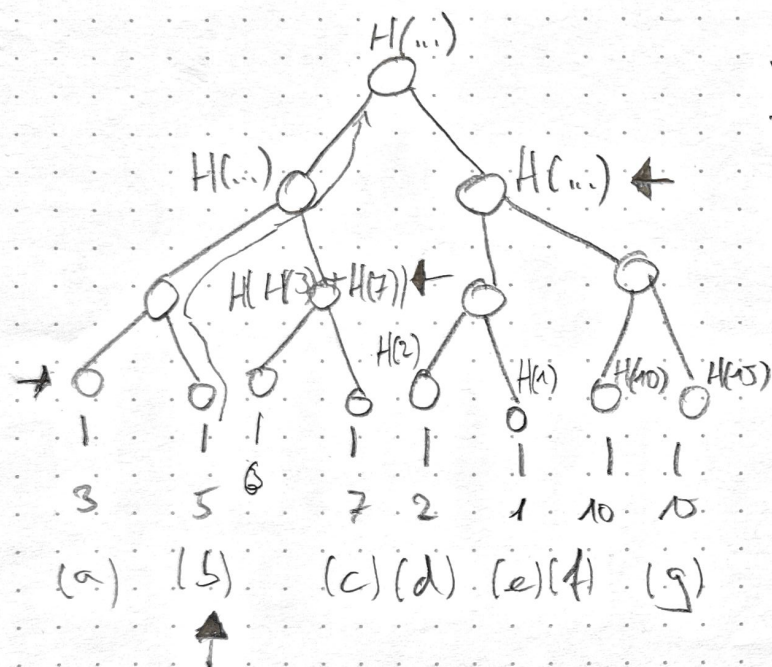


Flat Merkle tree

Merkle proof: $O(n-1)$

Proving inclusion of 1 leaf: $O(n)$

$O(n-1)$



Binary Merkle tree

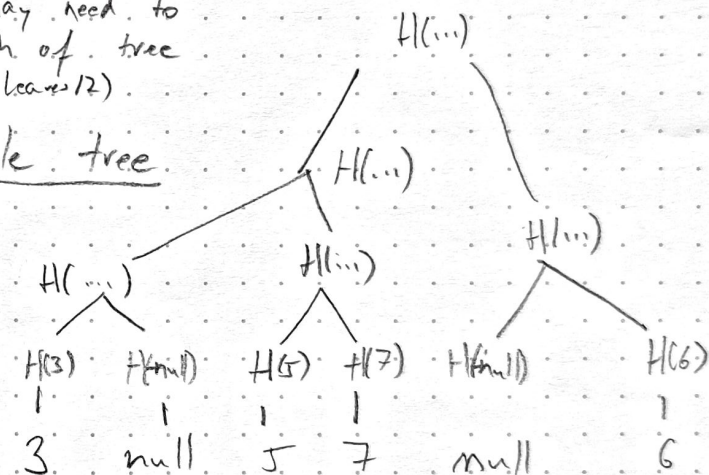
Merkle proof: $O(3)$

Proving inclusion: may need to recompute 1 branch of tree roughly $O(\text{leaves}/2)$

Sparse Merkle tree

Merkle proof: $O(3)$

Proving non-inclusion: $O(3)$



Sparse MT inclusion proof: Proving is $\frac{\text{leaf count}}{2}$ roughly where data was entered.