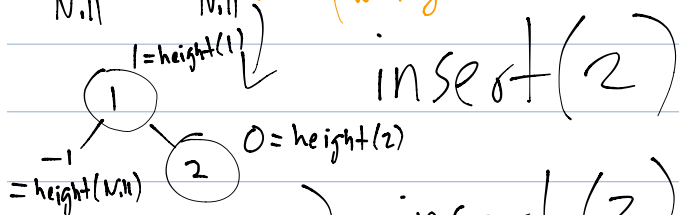


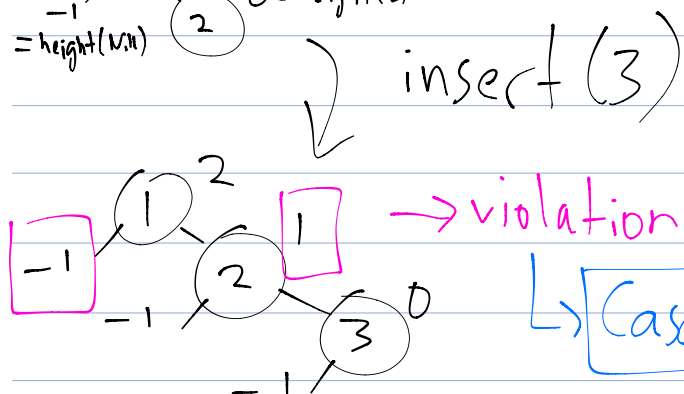
Conventions:

$$\text{height}(\text{Nil}) = -1$$

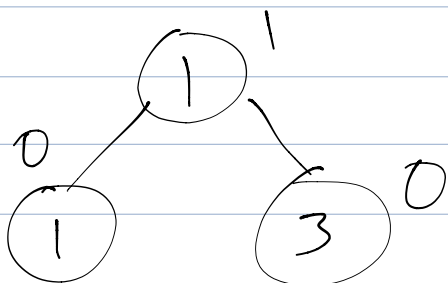
$$\text{height}(1 \text{ Node}) = 0 \dots \text{etc}$$



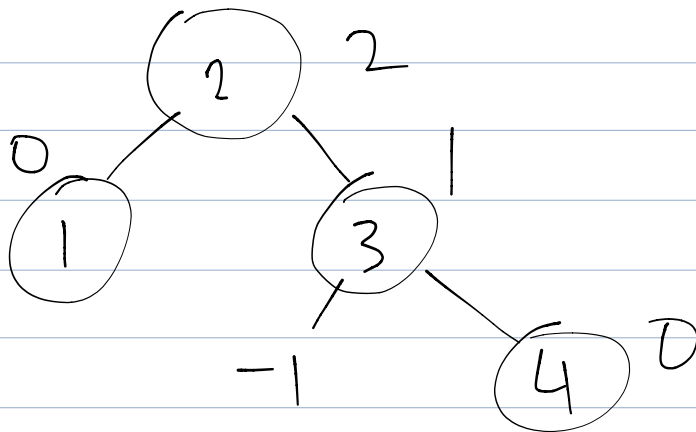
want: $|h_l - h_r| \leq 1$



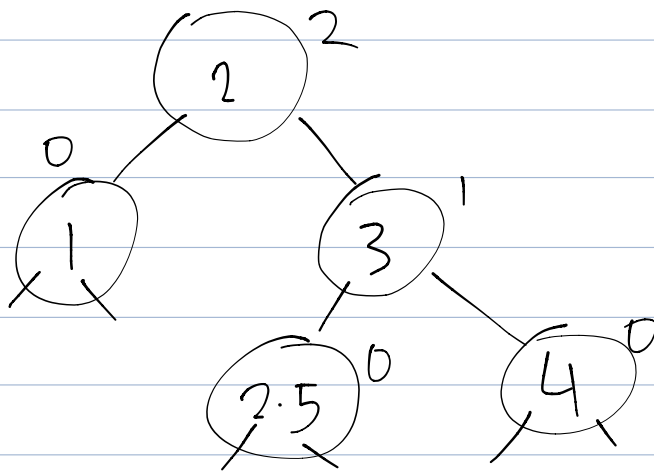
Rebalance LR(x=1)
Case 1



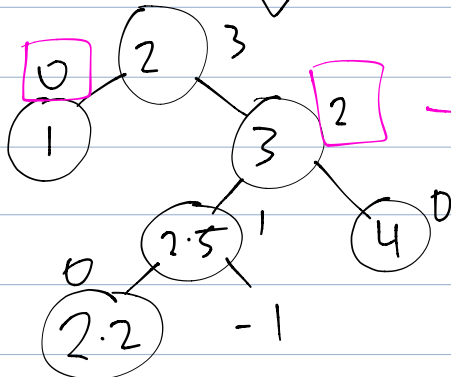
insert(4)



↓ insert(2.5)



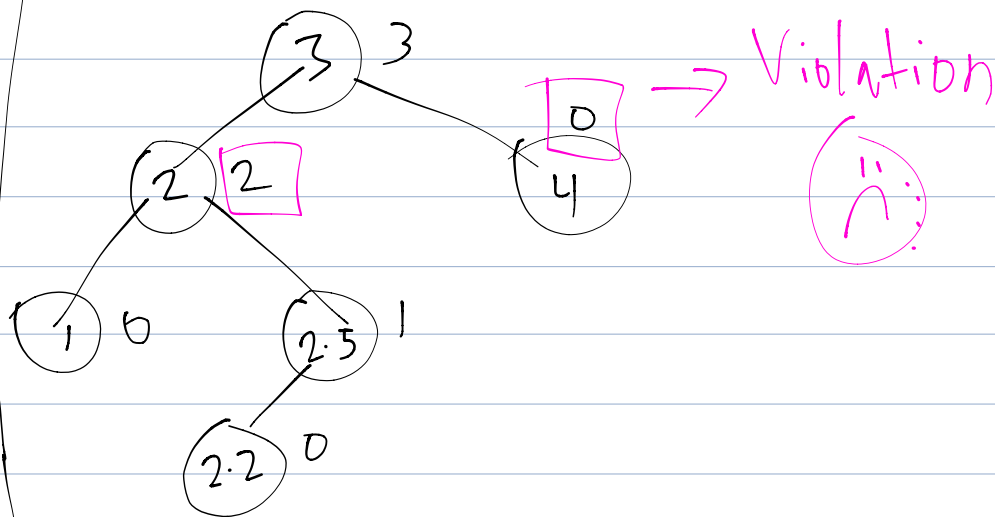
↓ 2.2



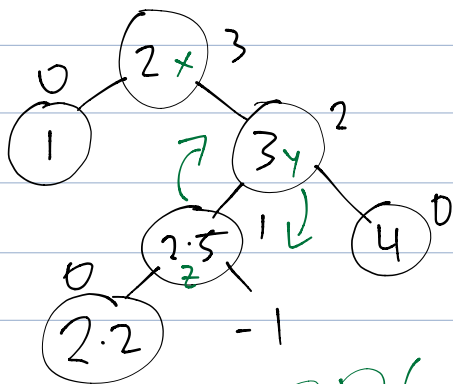
→ violation!
(Case 3)



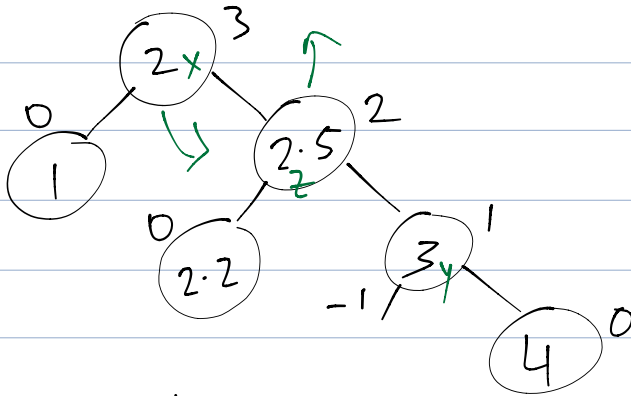
Left Rotation $LR(x=3)$
doesn't work



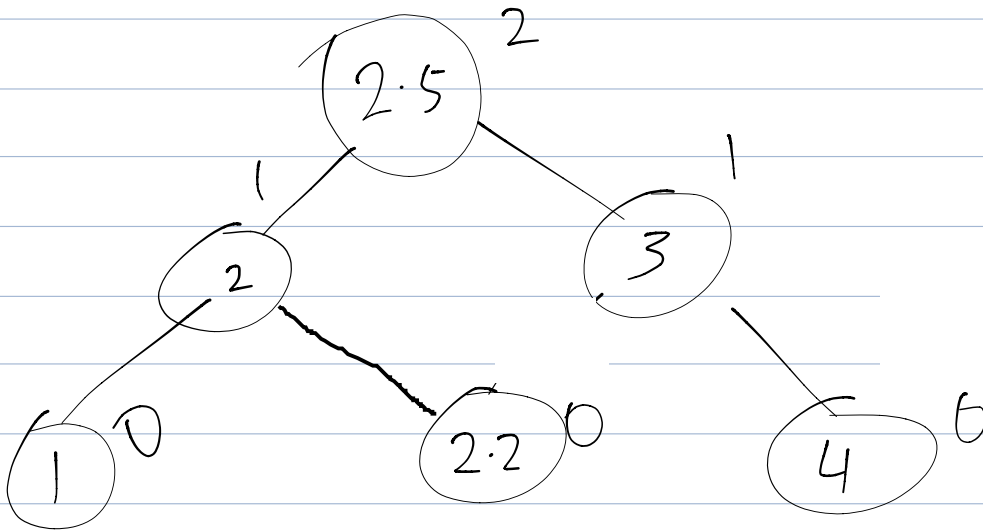
instead Case 3 double Rotation



$RR(y=2)$



↓ LR(x=2)



✓ Balance!

- don't forget to re-update heights $\Rightarrow O(\log n)$
- Case 2? where is it? Can it happen with only insertions?