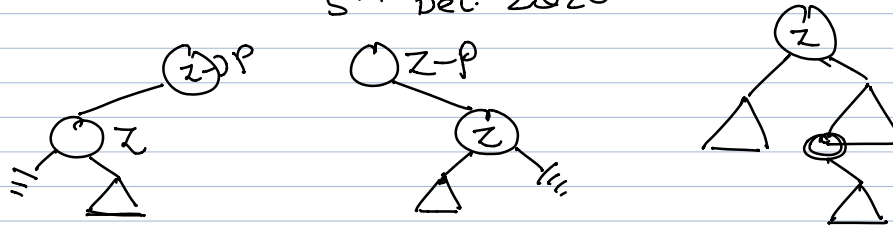
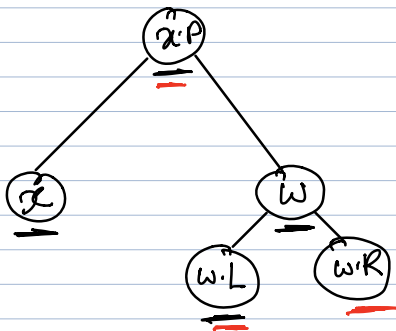


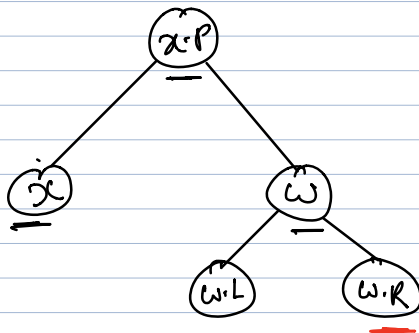
Masterclass in D.S. & ALG.
Batch #17
5th Dec. 2020.



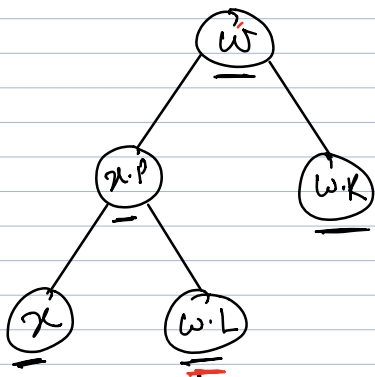
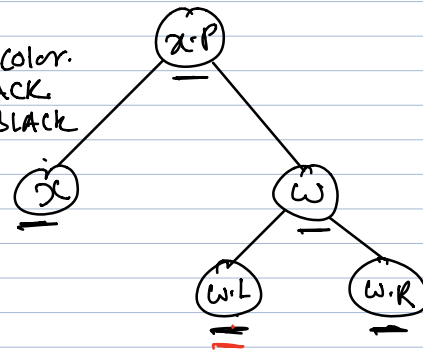
CASE-4: x 's sibling w is Black
 w .right.color is red



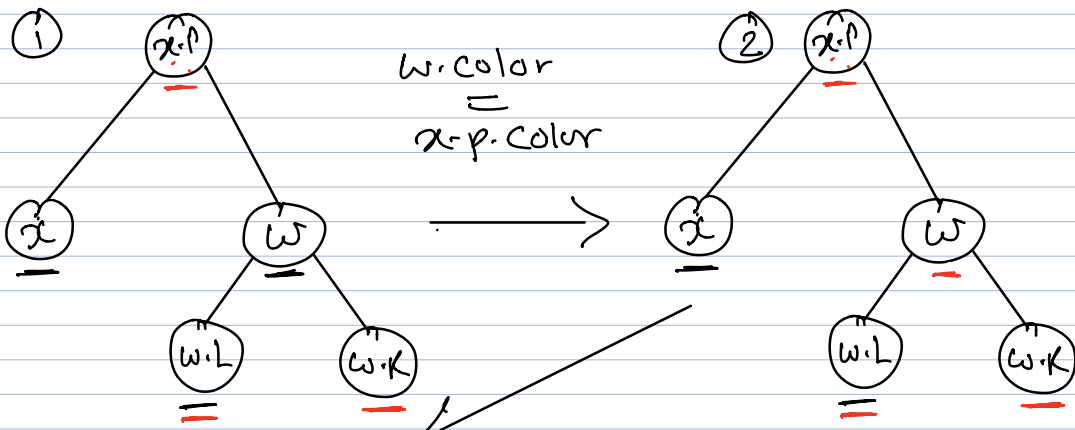
Case-4 \rightarrow (i) $x.p$.color == BLACK.



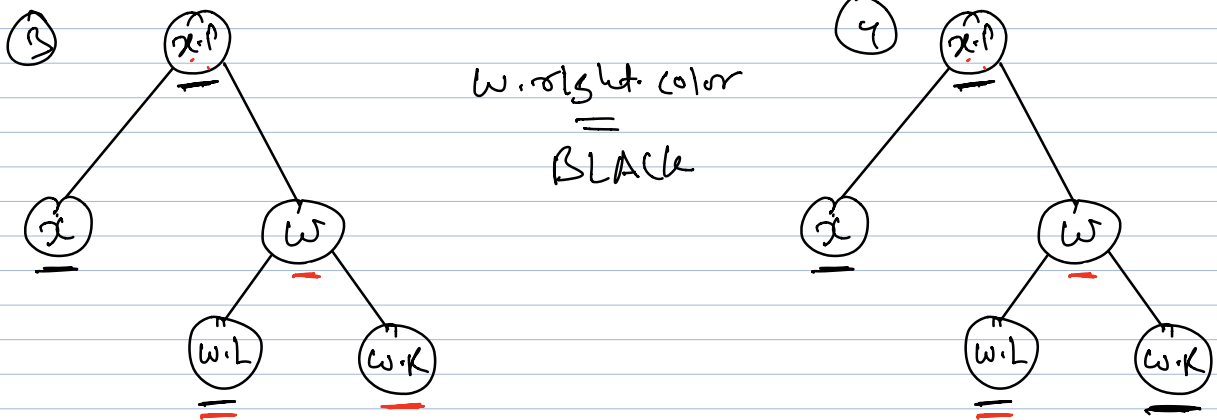
After
 w .color = $x.p$.color.
 $x.p$.color = BLACK
 w .right.color = BLACK



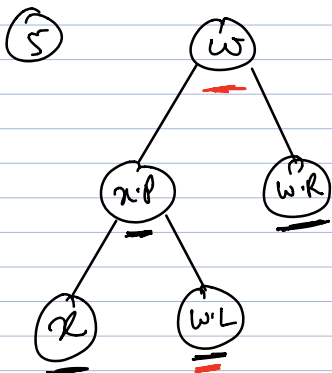
Case - (4) - (ii) $x.p$ is RED.



$x.p.color = BLACK$



LEFT-ROTATE($T, x.p$)

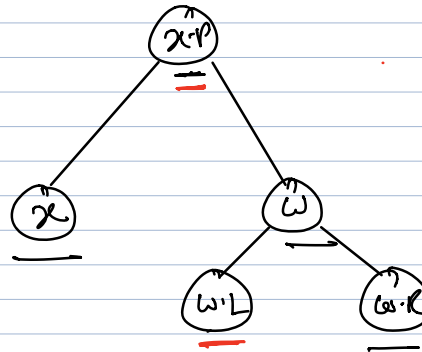


CASE-(3) α -sibling w is black.

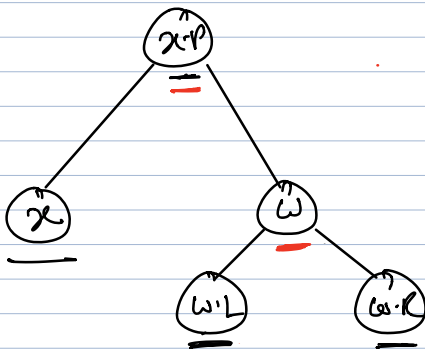
$w.l.color = RED$

$w.r.color = BLACK$.

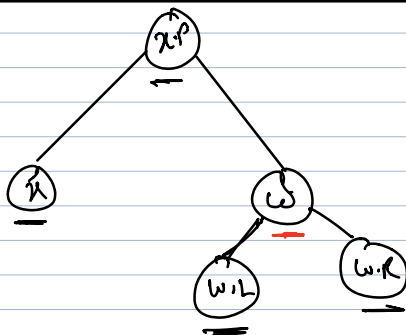
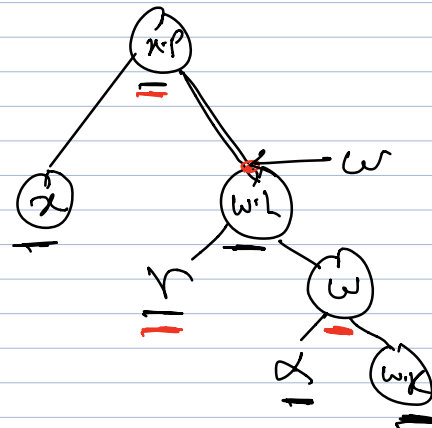
$w.left.color = BLACK;$
 $w.right.color = BLACK;$
 $w.color = RED;$
 $RR(T, w)$
 $w = \alpha.p.right$



After $w.l.color = BLACK$
 $w.r.color = BLACK$
 $w.color = RED$.

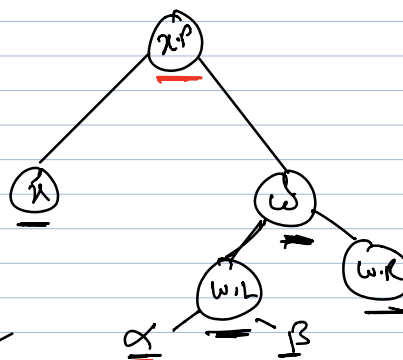


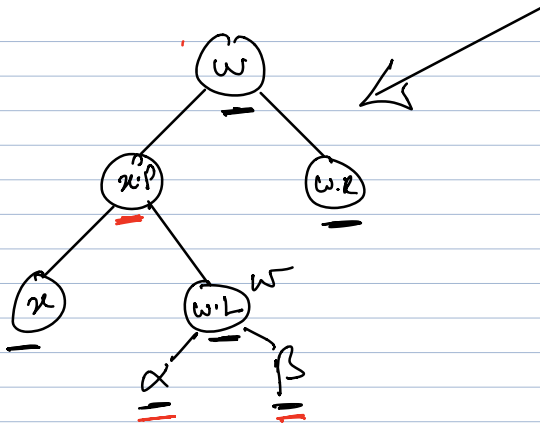
$RR(T, w)$



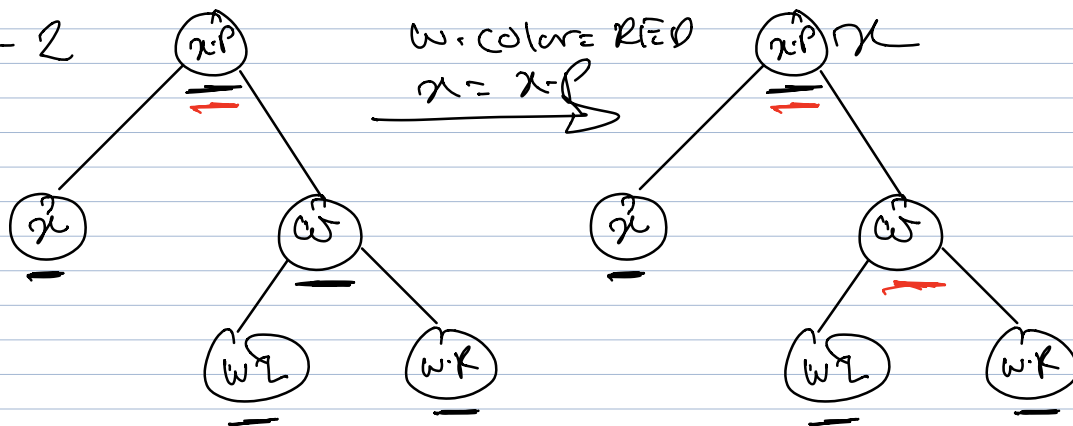
$w.color = BLACK;$
 $\alpha.p.color = RED;$
 $LEFT_ROTATE(T, \alpha.p)$
 $w = \alpha.p.right$

After $w.color = BLACK$
 $\alpha.p.color = RED$

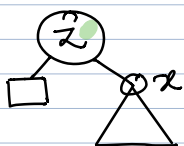




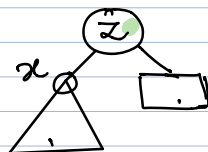
Case-2



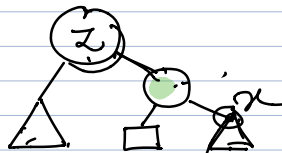
BST-Delete



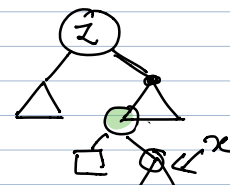
Case (i)
 $z \rightarrow L = \text{NIL}$
 $z \rightarrow R \neq \text{NIL}$



Case (ii)
 $z \rightarrow L \neq \text{NIL}$
 $z \rightarrow R = \text{NIL}$



Case (iii)
 $z \rightarrow L \neq \text{NIL}$
 $z \rightarrow R \neq \text{NIL}$
 $\text{SUCCESSOR}(z)$
 $=$
 $z \rightarrow \text{right}$



Case (iv)
 $z \rightarrow L \neq \text{NIL}$
 $z \rightarrow R \neq \text{NIL}$
 $\text{SUCCESSOR}(z)$
 \neq
 $z \rightarrow R$