

## Zadanie 5

① Right-Rotate( $T, y$ )  
 $x = y.left$   
 $y.left = x.right$   
 if  $x.right \neq NIL$   
 $x.right.p = y$

$x.p = y.p$

if  $y.p = NIL$   
 $T.root = x$

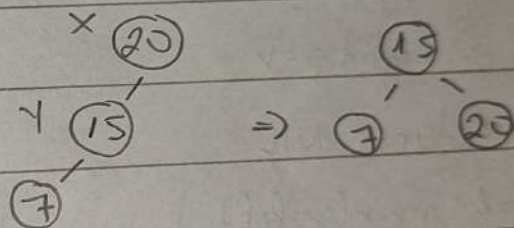
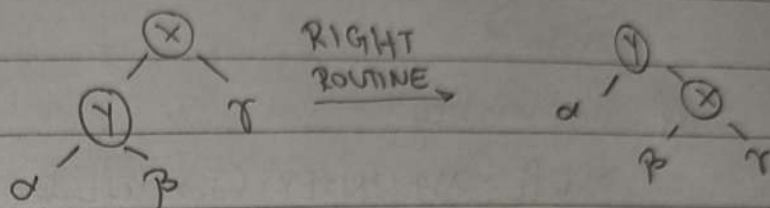
else if  $y == y.p.right$   
 $y.p.right = x$

else

$y.p.left = x$

$x.right = y$

$y.p = x$



② AVL-INSERT( $T, x, key$ )

①

if  $x == NIL$

$x.key = key$

$x.h = 1$

if  $key < x.key$

$x.left = \text{AVL-INSERT}(T, x.left, key)$

$x.left.p = x$

if  $key > x.key$

$x.right = \text{AVL-INSERT}(T, x.right, key)$

$x.right.p = x$

else return  $NIL$

$x.h = 1 + \max(x.left.h, x.right.h)$

$balance = \text{BALANCE-FACTOR}(x)$

if  $balance > 1$  and  $key < x.left.key$

return  $\text{RIGHT-ROTATE}(T, x)$

if  $balance < -1$  and  $key > x.right.key$

return  $\text{LEFT-ROTATE}(T, x)$

if  $balance > 1$  and  $key > x.left.key$

$x.left = \text{LEFT-ROTATE}(T, x.left)$

return  $\text{RIGHT-ROTATE}(T, x)$

if  $balance < -1$  and  $key < x.right.key$

$x.right = \text{RIGHT-ROTATE}(T, x.right)$

return  $\text{LEFT-ROTATE}(T, x)$

return  $x$



BALANCE-FACTOR(x)

if  $x = \text{NIL}$

return 0

else

return  $x.\text{left}.h - x.\text{right}.h$

⇒ analiza VSA:

- prvo ubacujemo čvorove po BST principu, čija je složenost  $O(\log n)$ ,  $n$  je broj članova

- nakon toga stablo se rotira kako bi ostalo AVL stablo;  
svaka rotacija je  $O(1)$

- visina AVL stabla je  $\log n$  i zato je vremenska  
složenost svih rotacija ukupno  $O(\log n)$

⇒ VSA u AVL-INSERT je  $O(\log n)$