AVL Trees

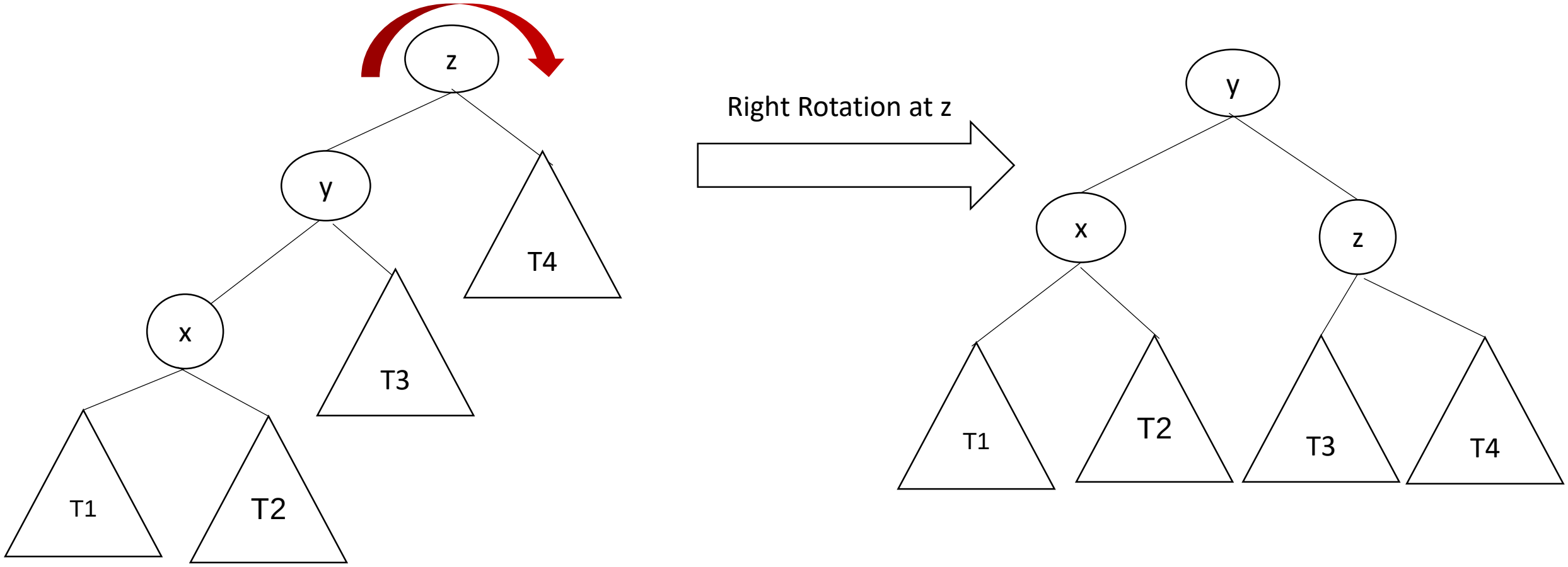
(Adelson, Velskii and Landis)

Rotations

- Rotations – Single and Double
- Single Rotation – Left , Right
- Double – Left Right , Right Left

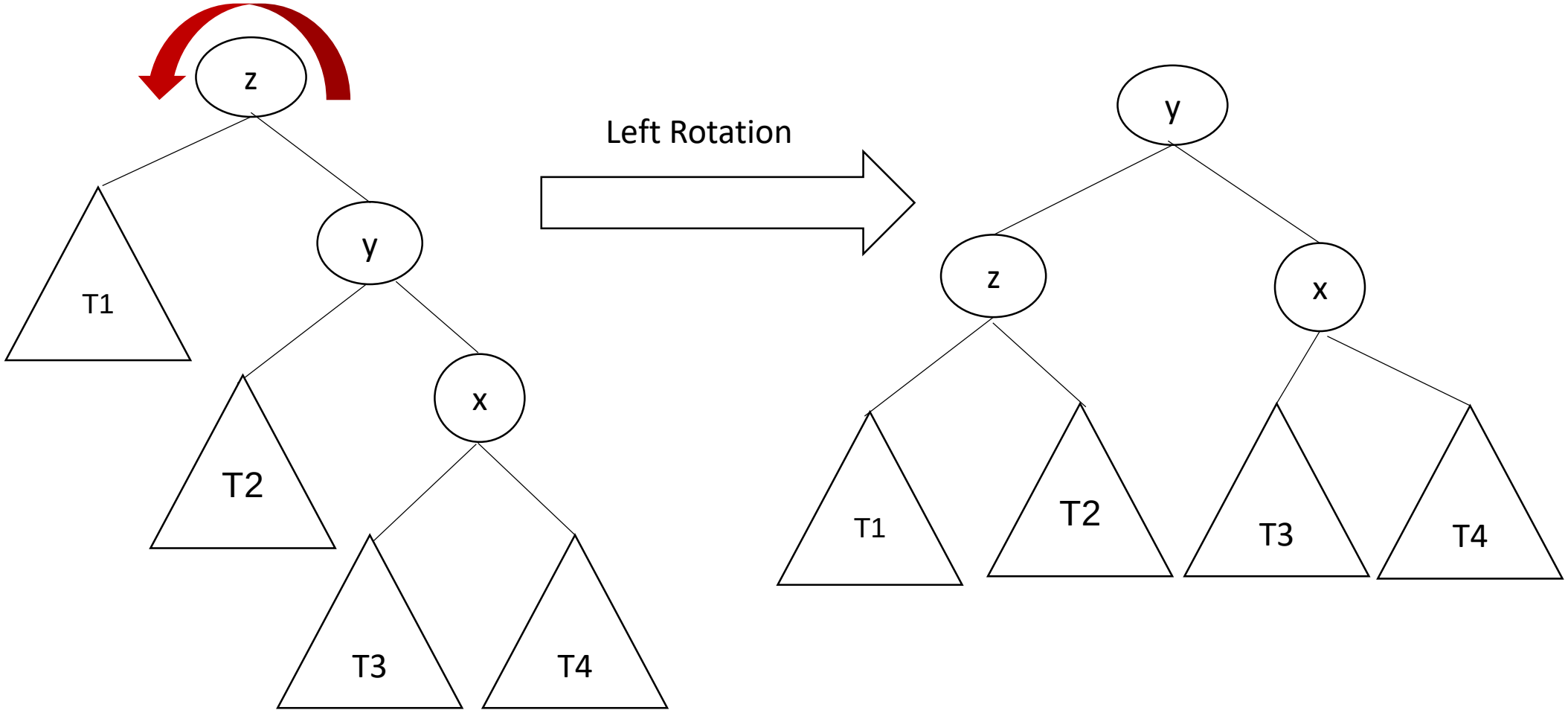
Right Rotation

- Required when the inserted node is in Left-Left- Branch of unbalanced node (z)



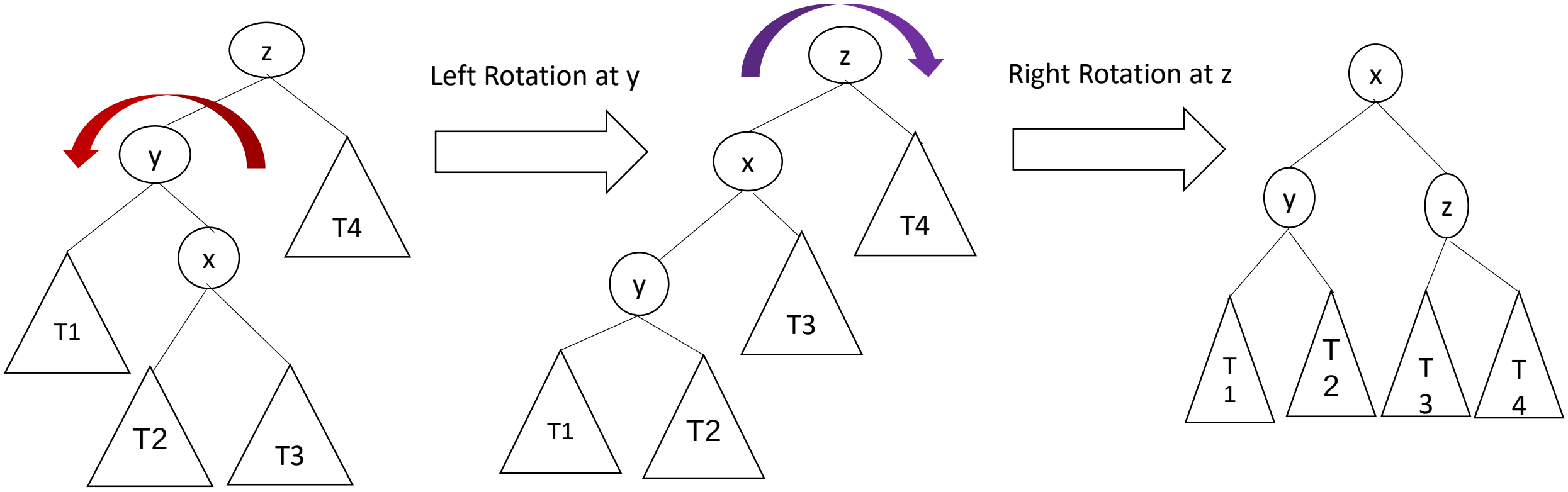
Left Rotation

- Required when the inserted node is in Right-Right- Branch of unbalanced node (z)



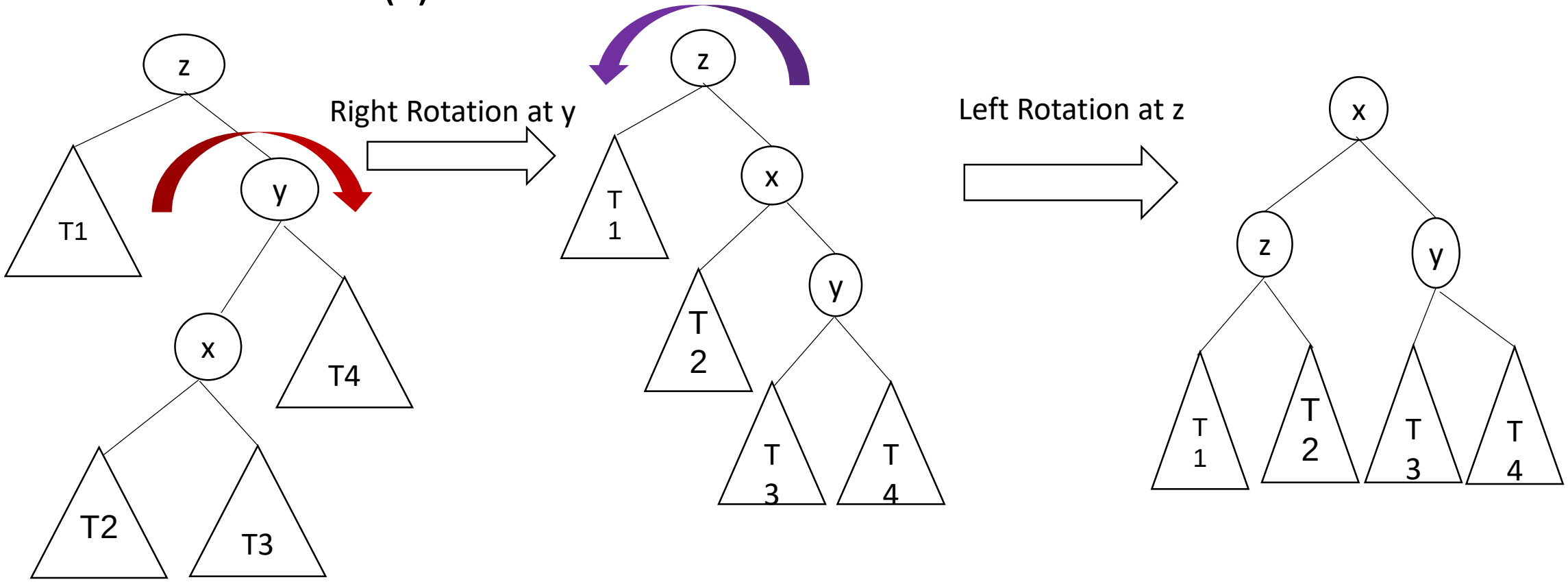
Left Right Rotation

- Required when the inserted node is in Left-Right- Branch of unbalanced node (z)



Right Left Rotation

- Required when the inserted node is in Right – Left Branch of unbalanced node (z)



Insertion

1. Let w be the inserted node
2. Starting from w, travel up and find the first unbalanced node z
3. Let y be the child of z and x be the grandchild of x – in the path from w to z
4. Rebalance using any one of the rotations

Deletion

1. Perform BST delete for w (node deleted)
2. Starting from w, travel up and find the first unbalanced node z
3. Let y be the larger height child of z and
   x be the larger height child of y
4. Rebalance using appropriate rotation as in insertion
5. After rotation at z, may have to perform rotation at ancestors of z

- must continue to trace the path until we reach the root