Which Rotation to do?

→ Look at the deepest node that's imbalanced (+2 or −2), closest to addition.

→ Note the "path" the node took near the imbalanced node and the child

→ "around" once at the children — it will be the one which had the new node added to one child's subtrees.

→ "direction" of rotation is around the child

→ have to be added to a child's subtree to increase height > 1

$+2$

new node

R

$\Rightarrow$ Right Rotation

-2

$\Rightarrow$ Left Rotation

$+2$

$\Rightarrow$ LR Rotation

$\Rightarrow$ RL Rotation

AVL Tree — 4, 7, 9, 6, 5, 2, 10

x → (4) 0 →7→ (4) -1 →9→ (4) -2 ← Left rotate around this one
                    \   \
                   (7) 0   (7) -1   → (7) 0
                                      \   /   \
                                     (9) 0   (4) 0 (9) 0

→6→   (7) -1   →5→   (7) 2   (7) 1
      /   \   /   \   /   \
   (4) -1 (9) 0   (4) -2 (9) 0   (4) 0   (9)
     \   \   ─R→   \
    (6) 0   (6) 1   @6   (5)
                                   /   (child)   \
                                 (5) 0   (6)
                                                  RL↘

lowest imbalanced node

                                                            L @4
                                                            (rootof problem)
                                                            (7) +
                                                           /   \
                                                        (5) 0   (9) 0
                                                        /   \
                                                     (4) 0   (6) 0

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(5) 0   →R→   (7) 2   (7) 2
/   \   /   \   /   \
(4)   (7) 0   (5) 0   (9) 0 ←2   (5)   (9) 0
/   /   \   /   \   /   \
(2) 0 (6) 0 (9) 0   (4) 0 (6) 0   (4) 0 (6) 0
                      /
                   (2) 0
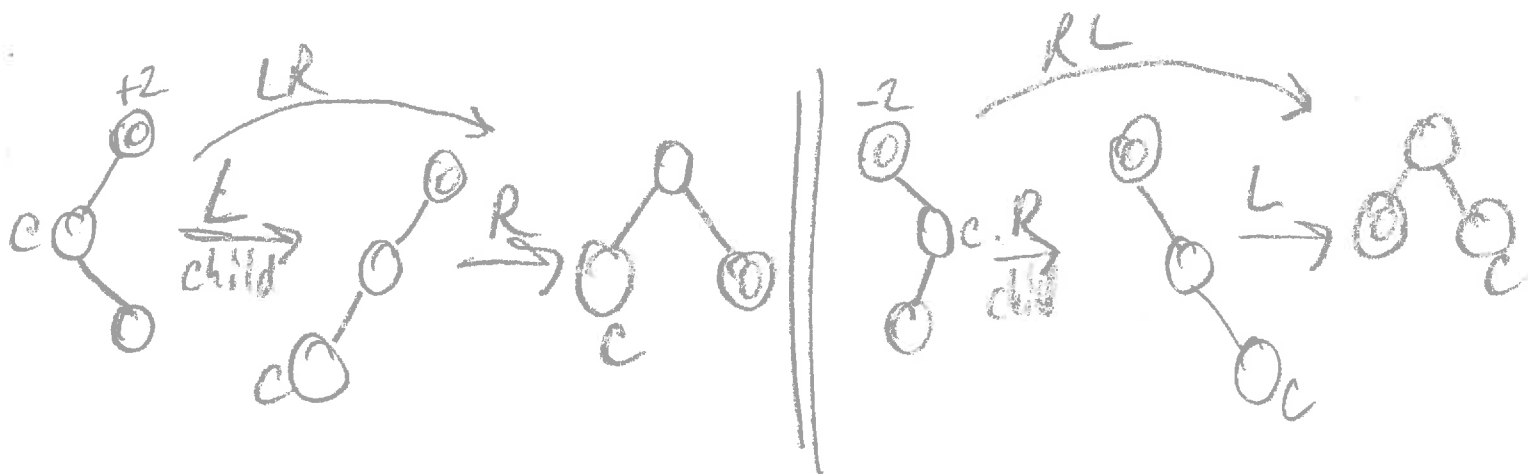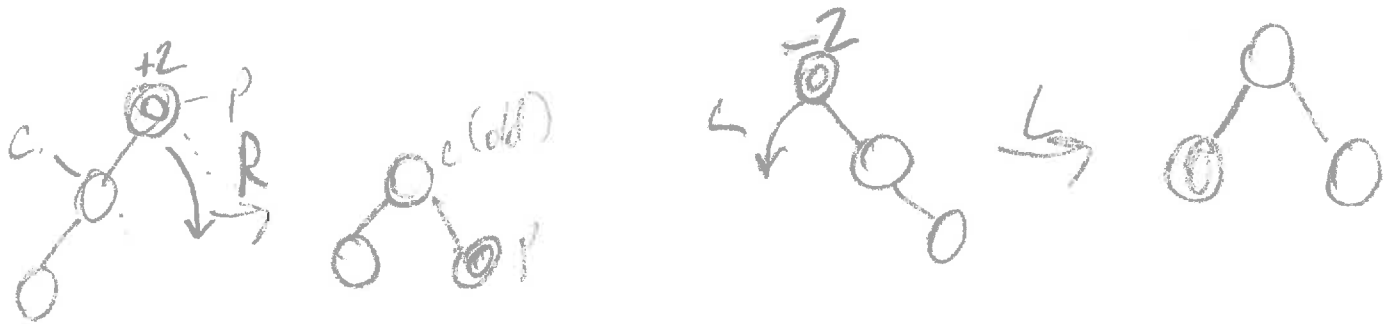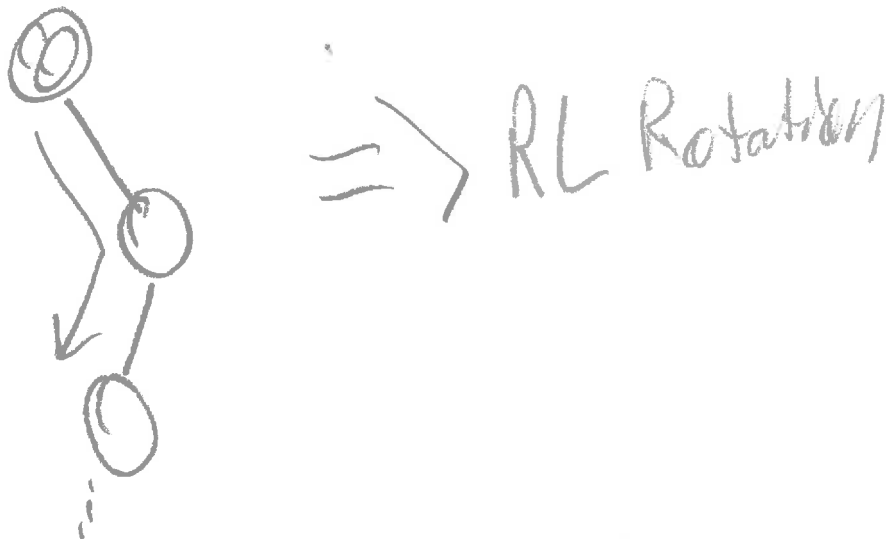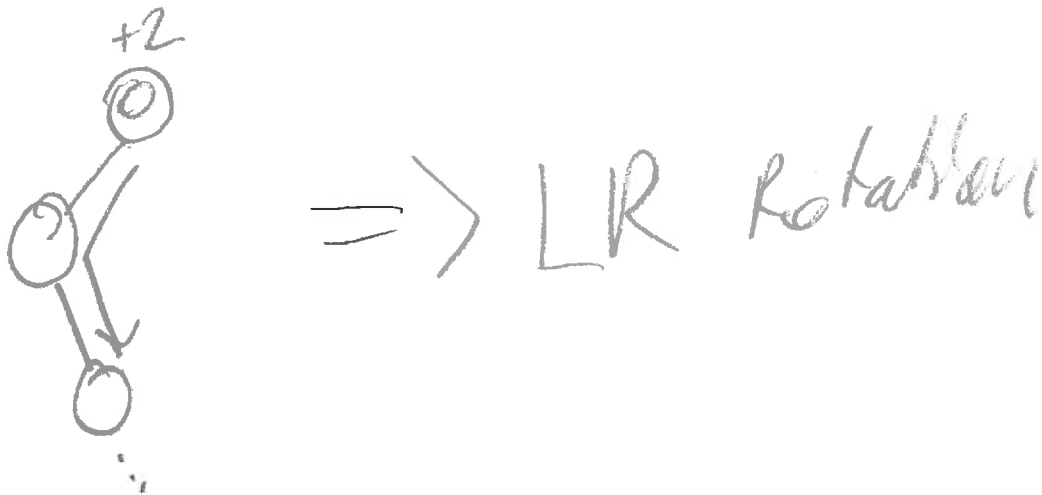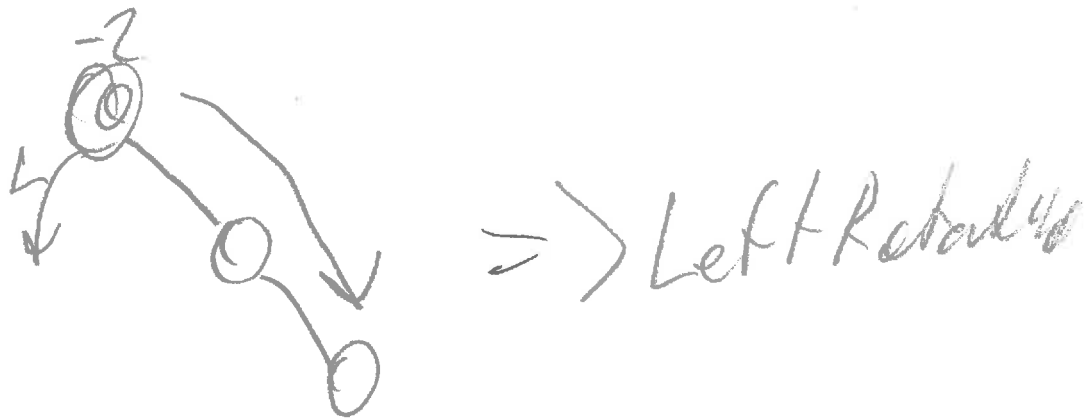
        ↓ 10
       (6) -1
      /   \
   (4) 1   (7) -1
   /   /   \
(2) 0   (6) 0   (9) -1
                    \
                   (10) 0
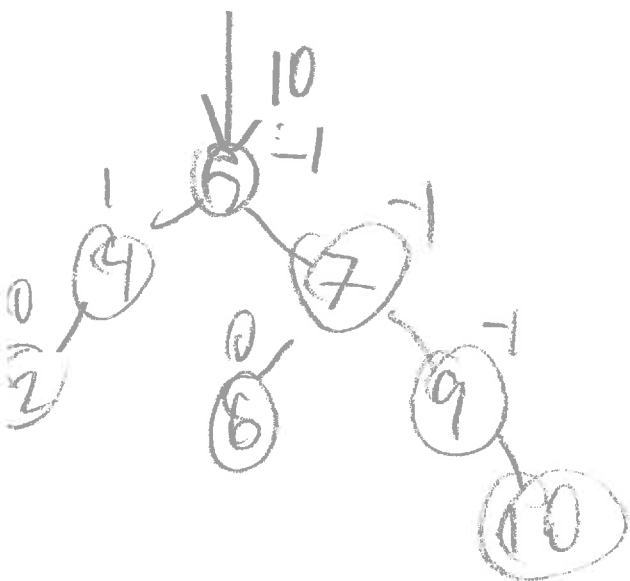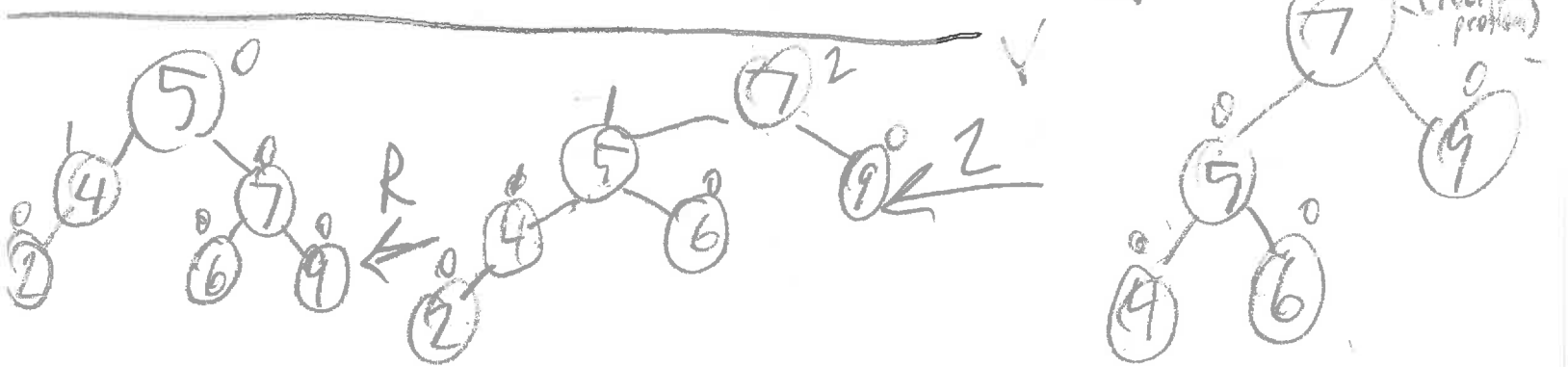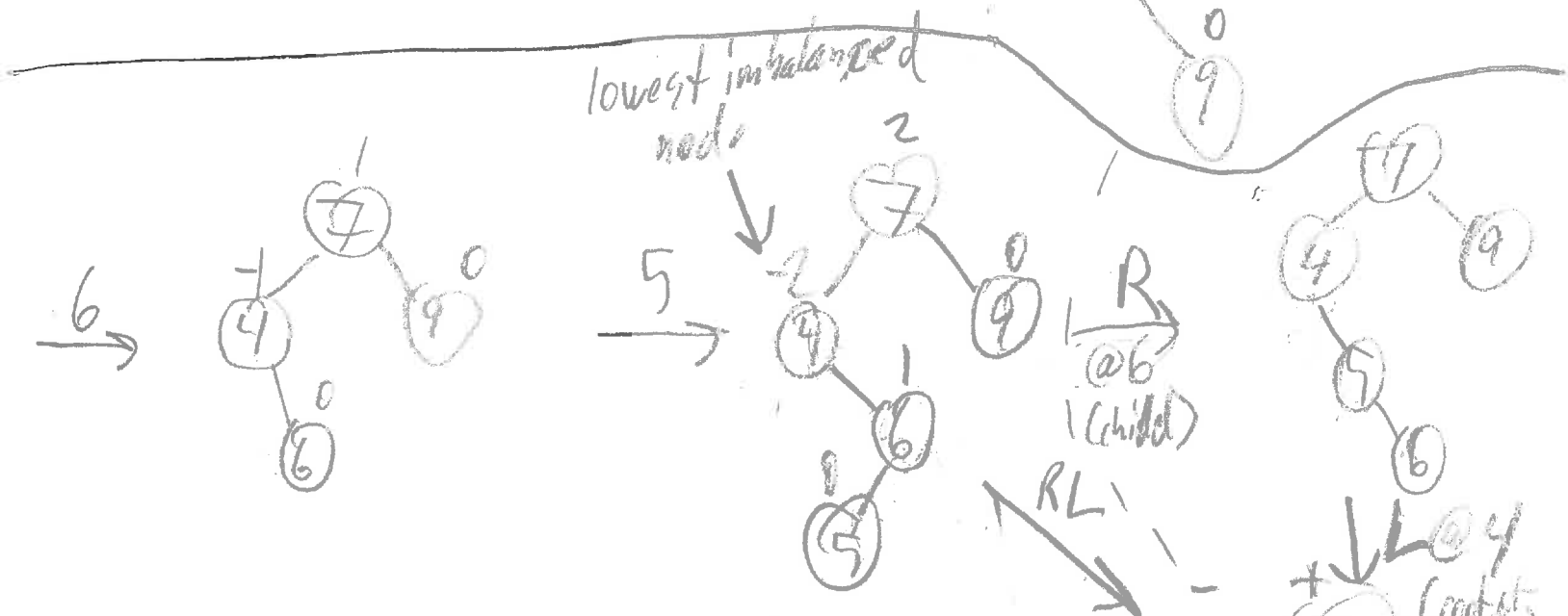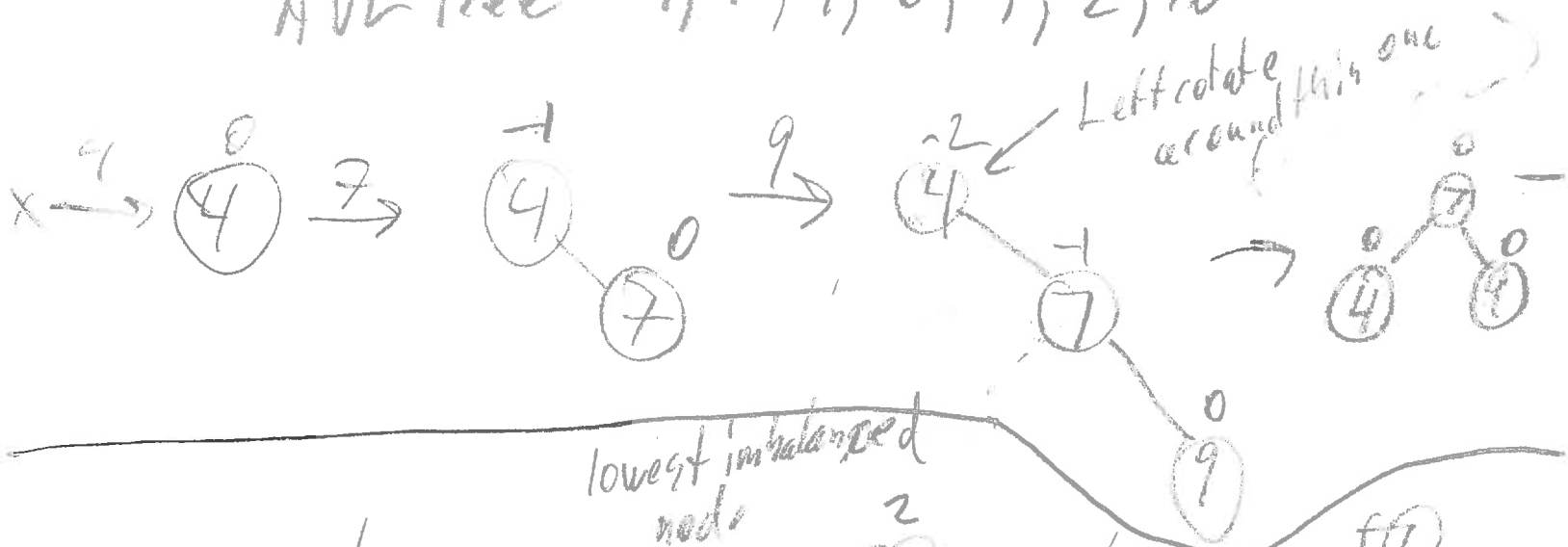
When doing LR rotation – do
L – Rotation around child, then
right around imbalanced node
Use the child that had the new
node added to it.

AVL Tree 63, 8, 5, 1, 4, 9

6 → 6 3 → 6/3 8 → 6/(4,8) 5 → 6/(3,8), 9

1 → 6/(3,8) 4 → unbalanced 6 ... L@3 → 6/(5,8)

inbalanced

diff for LR-Rotate

LR R @6

9

L @6