Lecture 13 Exercise Solutions

Mark Eramian

Exercise 1

The tree is an AVL tree.

Exercise 2

The tree is **not** an AVL tree. The critical node is the node containing element 20. The node exhibits RR imbalance.

Exercise 3

This is **not** and AVL tree. The critical node is the node containing element 2. The node exhibits LR imbalance.
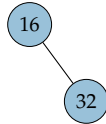
Exercise 4

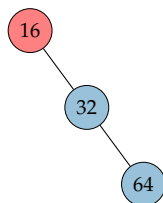This is an AVL tree. The maximum imbalance is 1.
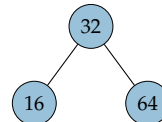
Exercise 5

Critical nodes are shown in red.
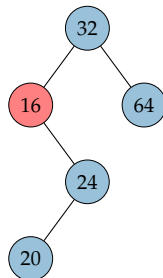
16

Insert 16

16
32

Insert 32

16
32
64

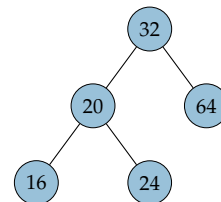Insert 64 - RR imbalance at node 16
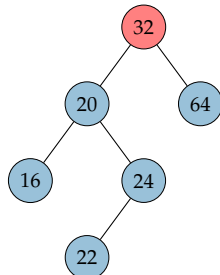
32
16   64

After left rotation of 16.

32
16   64
24

Insert 24

32
16   64
24
20
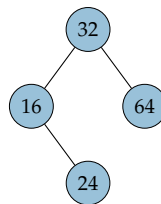
Insert 20 - RL Imbalance at 16

32
16   64
20
24
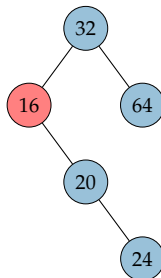
After right rotation of 24

32
20   64
16   24

After left rotation of 16

32
20   64
16   24
22

Insert 22 - LR Imbalance at 32

32
24   64
20
16   22

After left rotation of 20

24
20   32
16   22   64
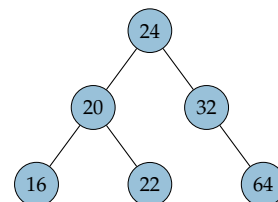
After right rotation of 32

2

Insert 21

Insert 98 – RR imbalance at 32.

After left rotation of 32.

Exercise 6

Critical nodes are shown in red.
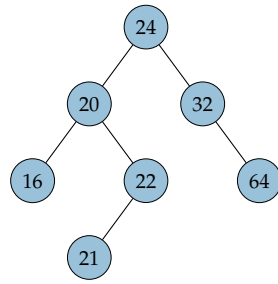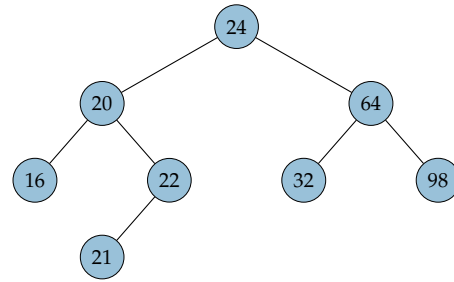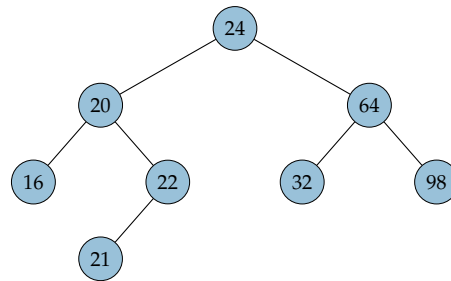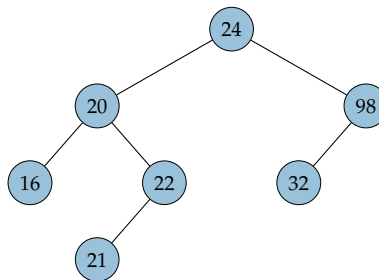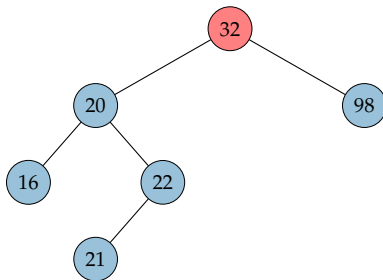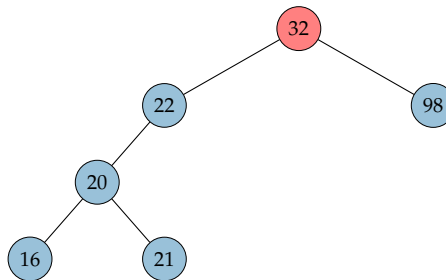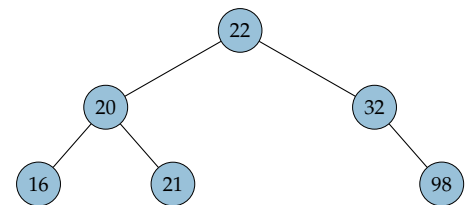

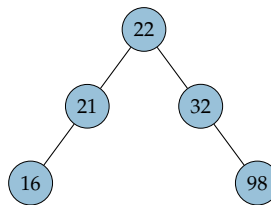Initial Tree

Delete 64

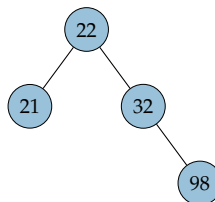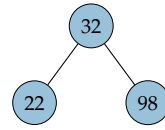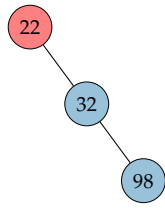Delete 24 - LR imbalance at 32.   After left rotation of 20   After right rotation of 32.

Delete 20

Delete 16

Delete 21 - RR imbalance at 22.   After left rotation of 22.