

CS 202 Fundamental Structures of Computer Science II

Assignment 4 – Balanced Search Trees

Assigned on: August 7 2020 (Friday)

Due Date: 16 August 2020 (Sunday) by 23:55

1) Question Part (40 points)

a) AVL tree

insert 50

50

insert 70

50

70

insert 90

50 ✖

70

90

Single left
→

70

50

90

insert 115

70

50

90

115

insert 95

70

50

90

115

95

Double right-left
→

70

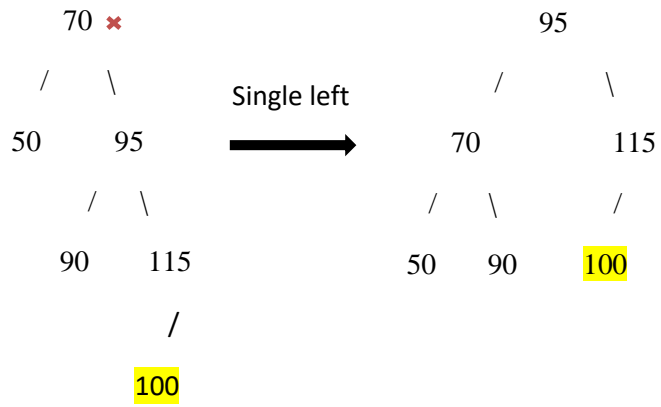
50

95

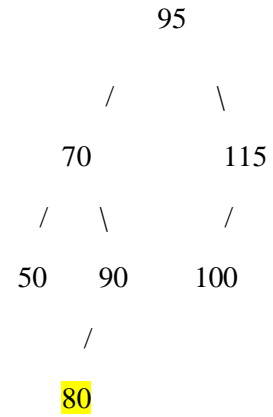
90

115

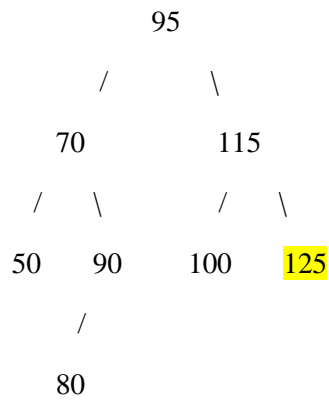
insert 100



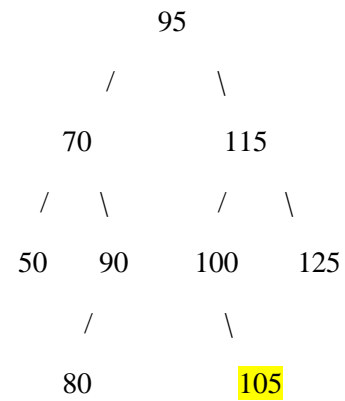
insert 80



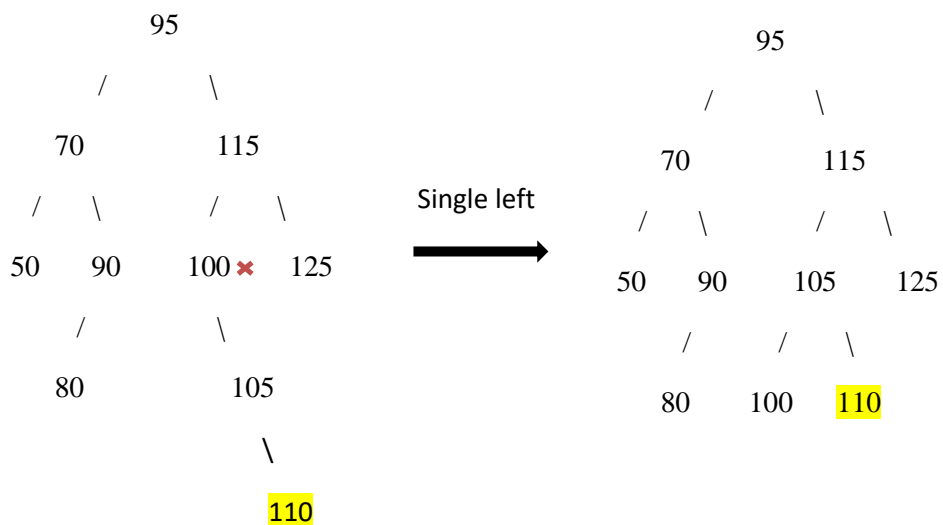
insert 125



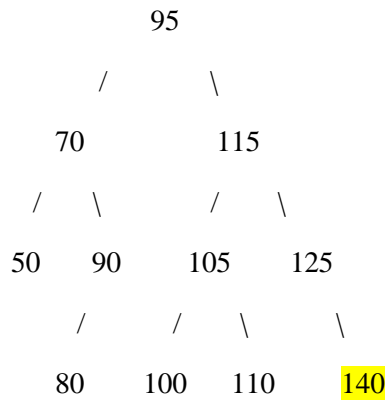
insert 105



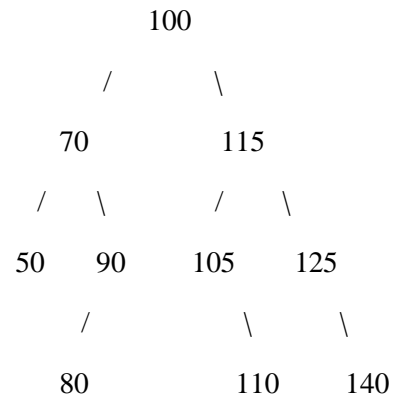
insert 110



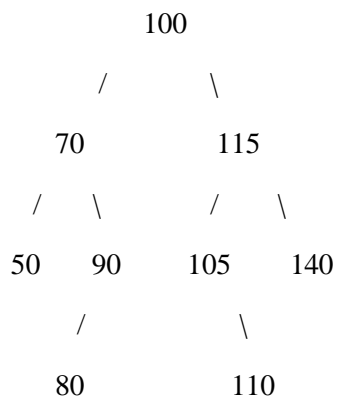
insert 140



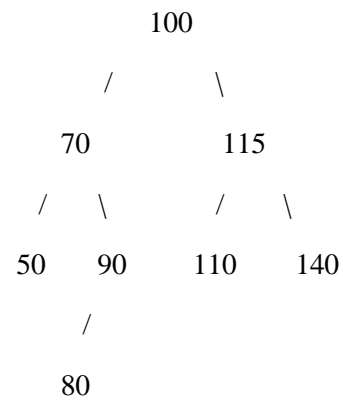
delete 95 (no rotation)



delete 125 (no rotation)



delete 105 (no rotation)



b) 2-3 tree

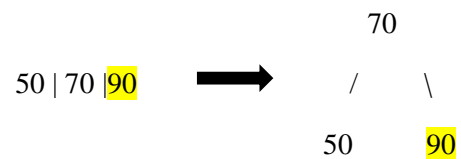
insert 50

50

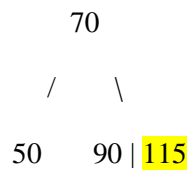
insert 70

50 | 70

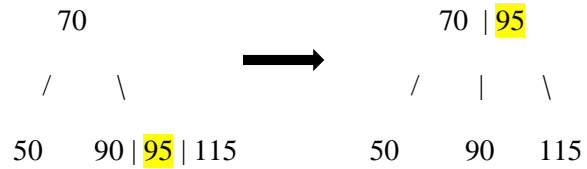
insert 90



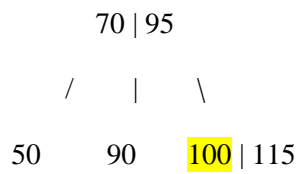
insert 115



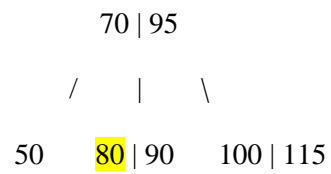
insert 95



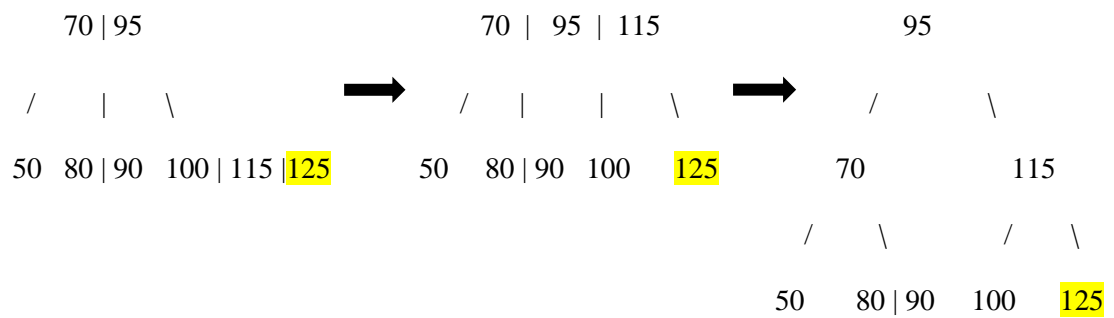
insert 100



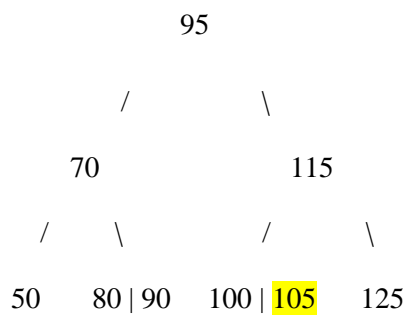
insert 80



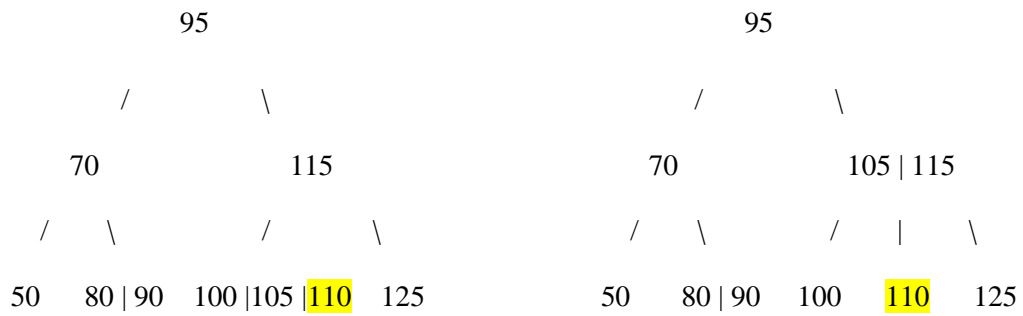
insert 125



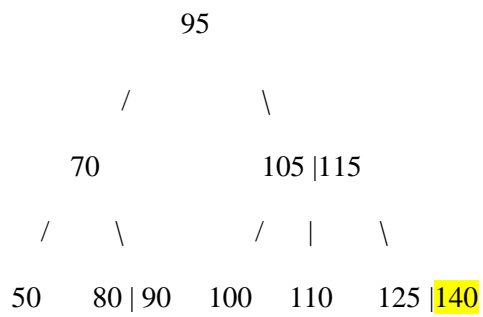
insert 105



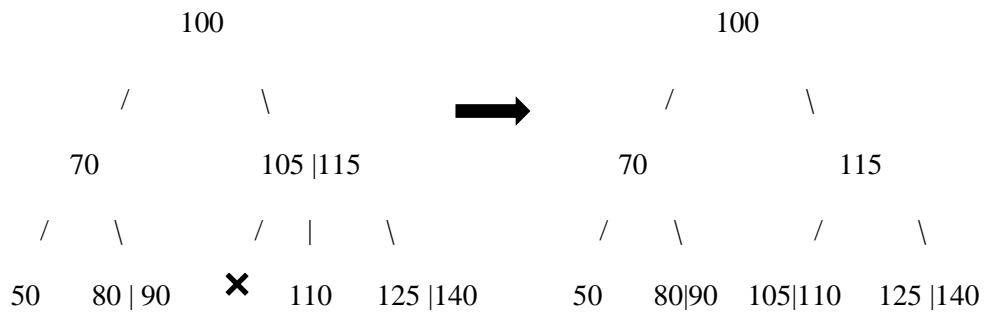
insert 110



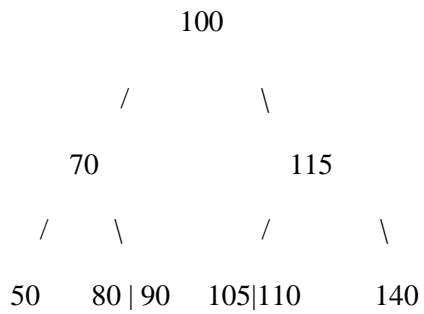
insert 140



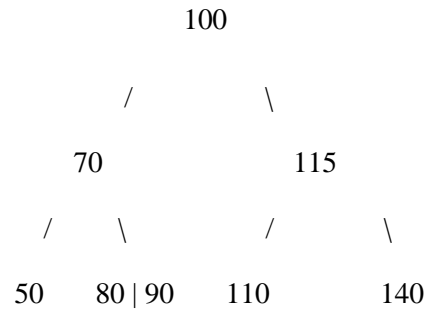
delete 95



delete 125



delete 105



c) 2-3-4 tree

insert 50

50

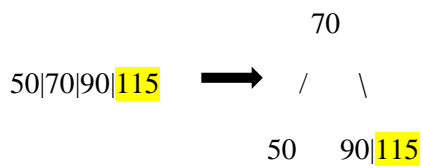
insert 70

50 | 70

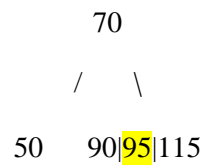
insert 90

50 | 70 | 90

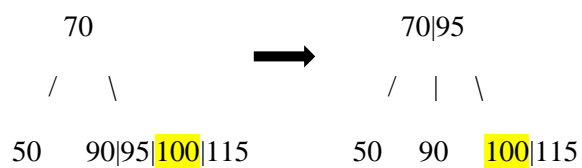
insert 115



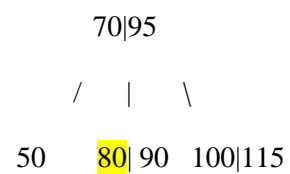
insert 95



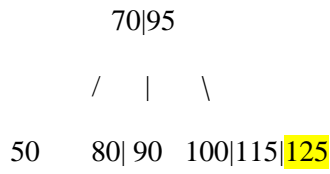
insert 100



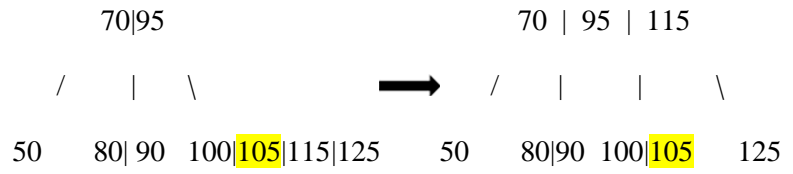
insert 80



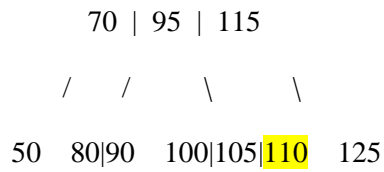
insert 125



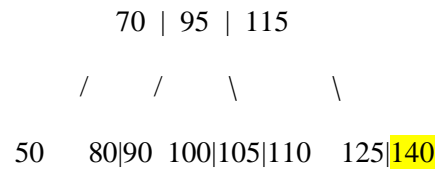
insert 105



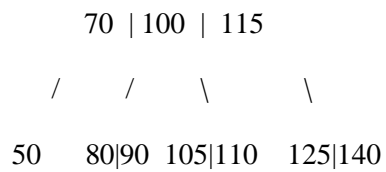
insert 110



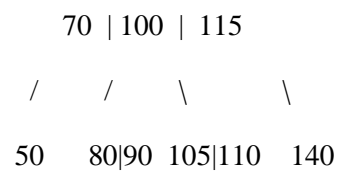
insert 140



delete 95



delete 125



delete 105

