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Set 4: 4.1, 4.2, 4.7, 4.9, 4.11, 4.19, 4.26, 4.27, 4.31, 4.43, 4.45

4.1:

- a. The root node in this figure is A
- b. the nodes which are leaves are G,H,I,L,M, and K

4.2:

a. Parent node of each

A: []
B: [A]
C: [A]
D: [B]
E: [B]
F: [C]
G: [D]
H: [D]
I: [E]
J: [E]
K: [F]
L: [J]
M: [J]

b. Child of each node

A: [B,C]
B: [D,E]
C: [F]
D: [G,H]
E: [I,J]
F: [K]
G: []
H: []
I: []
J: [L,M]
K: []
L: []
M: []

c. Siblings of each node

A: []
B: [C]
C: [B]
D: [E]
E: [D]
F: []
G: [H]

H: [G]

I: [J]

J: [I]

K: []

L: [M]

M: [L]

d. Depth of each node

A: [0]

B: [1]

C: [1]

D: [2]

E: [2]

F: [2]

G: [3]

H: [3]

I: [3]

J: [3]

K: [3]

L: [4]

M: [4]

e. Height of each node

A: [4]

B: [3]

C: [3]

D: [2]

E: [2]

F: [2]

G: [1]

H: [1]

I: [1]

J: [1]

K: [1]

L: [0]

M: [0]

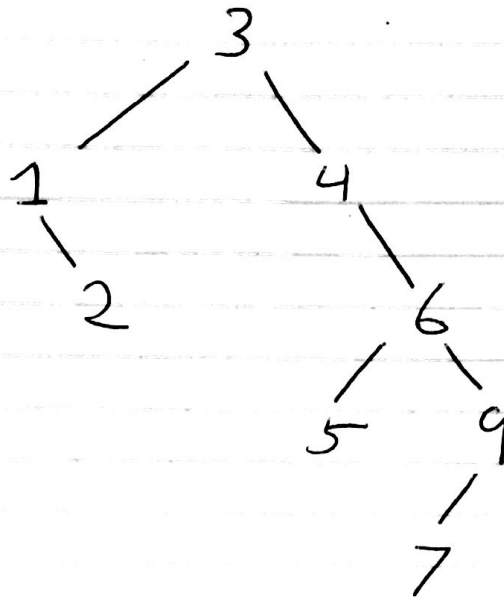
4.26:

```
static Position DoubleRotateToLeft(AvlNode * & k3) {
    Position k1,k2;
    k1 = k3 -> left;
    k2 = k1 -> right;
    k1 -> right = k2 -> left;
    k3 -> left = k2 -> left;
    k2 -> left = k1;
    k2 -> right = k3;
    k1 -> height = max(hieght(k1 -> left), hieght(k1 -> right)) + 1;
    k3 -> height = max(height(k3 -> left), height(k3 -> right)) + 1;
```

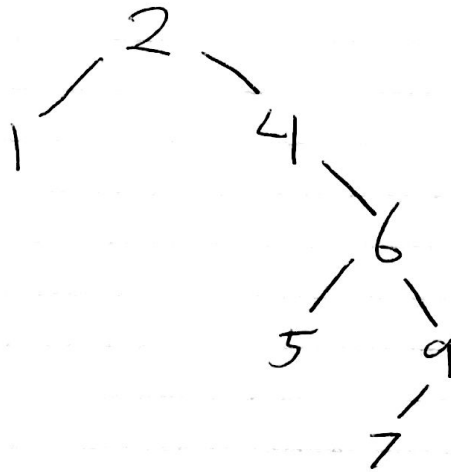
```
    k2 -> height = max(k1 -> height, k3 -> hight) + 1;  
    return k2  
}
```

4.9

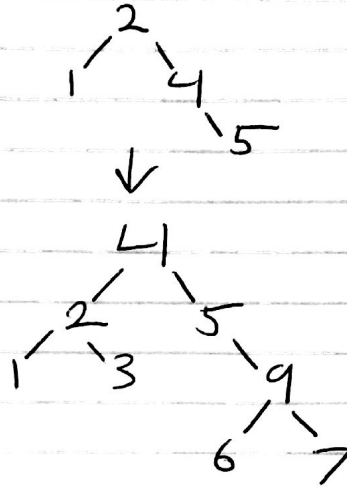
a)



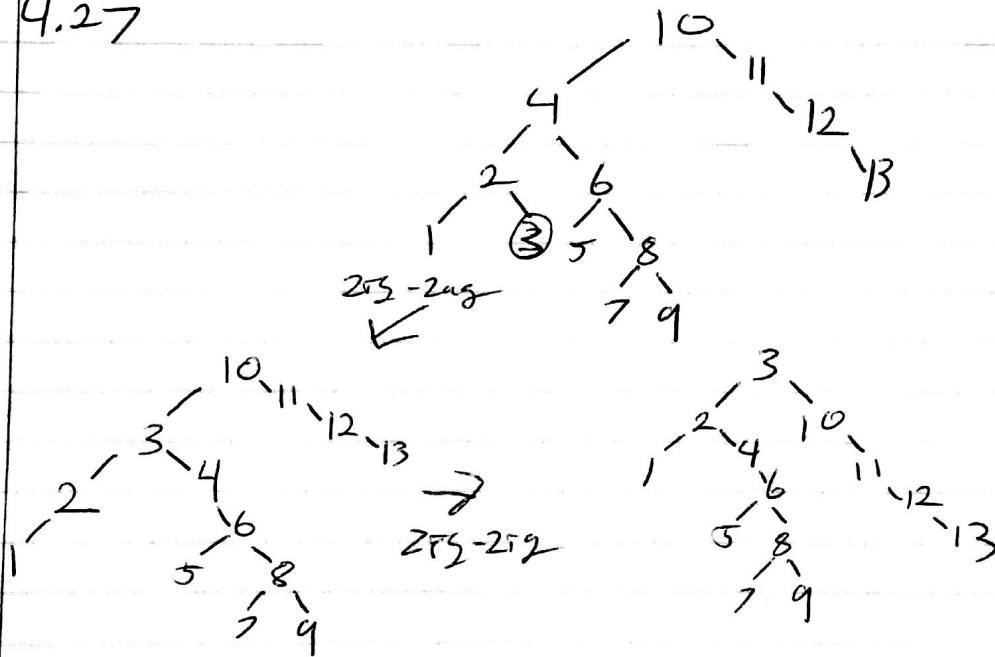
b)



4.19



4.27



4.43

