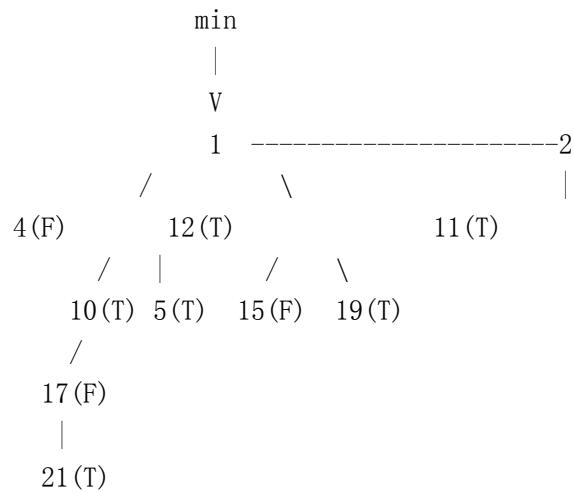


Exam02_solution

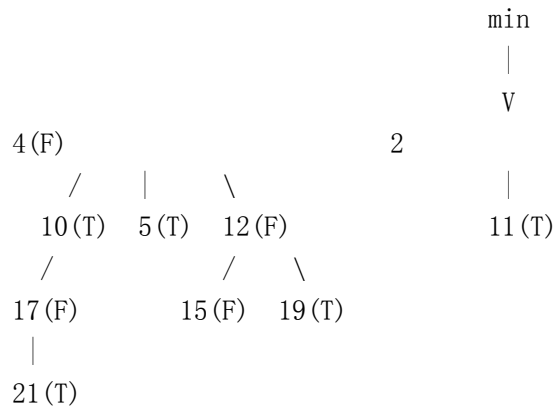
Summer , 2005

question 1.

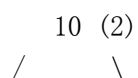
DecreaseKey operation by changing 9 by 2

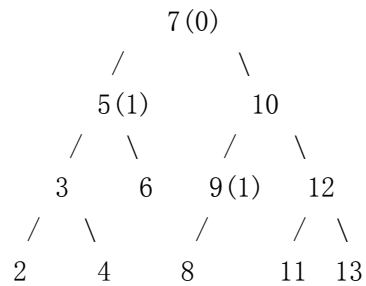
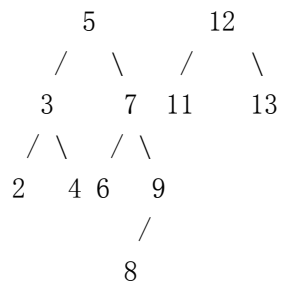


DeleteMin operation.

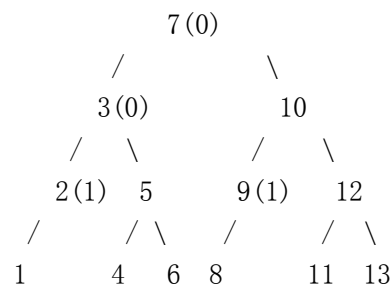


2) insert 8 (LR)



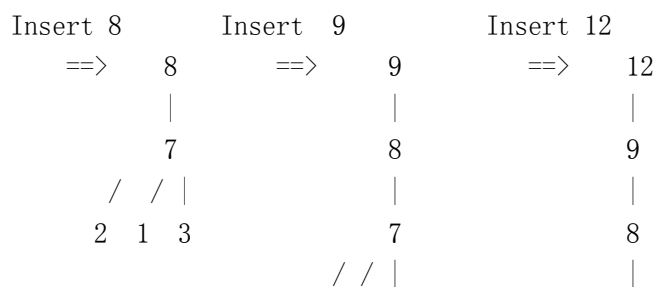
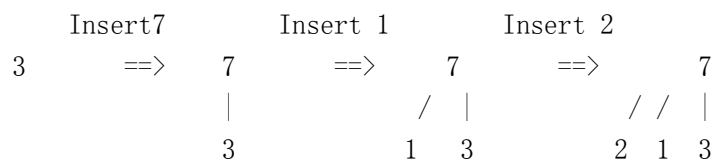


insert 1 (LL)



3)

(a) tree with smaller root becomes leftmost subtree.



2 1 3

7
/ / |
2 1 3

Insert 10

=====> 12
/ |
10 9
|
8
|
7
/ / |
2 1 3

(b) 12 17 meld two heaps

/ | / / |
10 9 2 1 3
|
8

17
/ / / |
12 2 1 3
/ |
10 9
|
8

(c) two-pass meld after remove min

pass 1: start subtrees left to right.

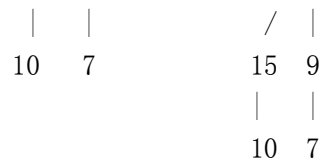
18 15 9 17
| | |
11 10 7

the number of subtrees was odd,
meld remaining original subtree with newly generated subtree.

18 15 17
| | |
11 10 9
|
7

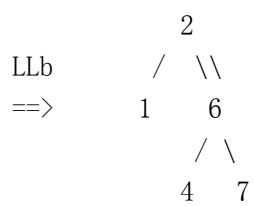
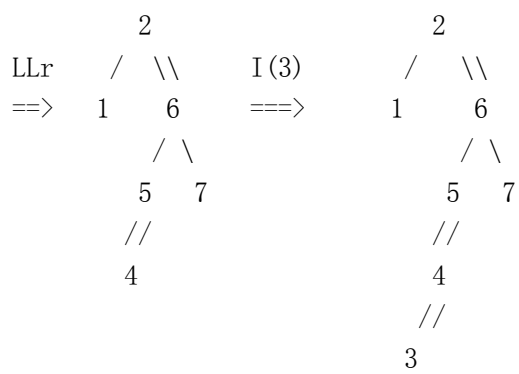
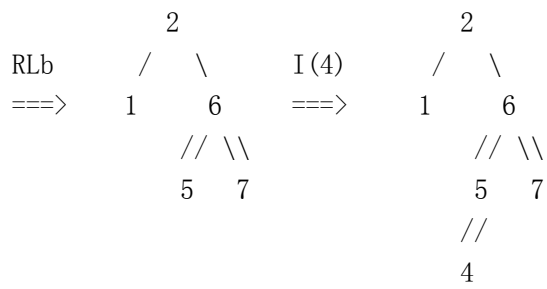
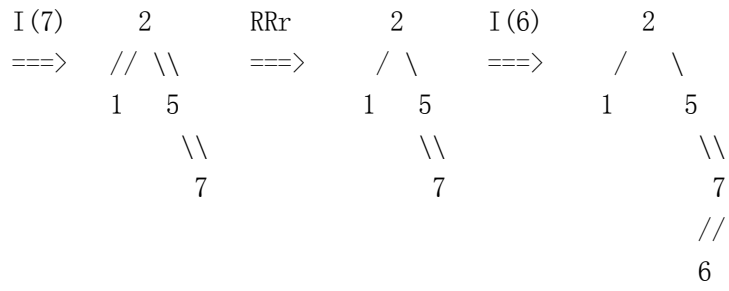
Pass 2: start with rightmost subtrees of pass 1

17 18
/ | step2 / |
15 9 ==> 17 11



(4)

(a)



```

// \\
3   5

```

(b) if red node is deleted, then no rebalancing needed

delete 14

```

      10
     /  \
    8    13
   //  \\ /  \
  7   9 12  15
       //
      11

```