

Comp 2013 Assignment 3

Question 1

check (T)

1. return helper(T.root, -inf, +inf)

helper(node, lower, upper)

1. if node == null return True

2. if node.key < lower or node.key > upper return False

3. return helper(node.left, lower, node.key) && helper(node.right, node.key, upper)

Question 2

(a)

0	11	$3 \times 11 = 33$	$33 \% 11 = 0$	$h(11) = 0$
1	15	$15 \times 3 = 45$	$45 \% 11 = 1$	$h(15) = 1$
2				
3	12	$12 \times 3 = 36$	$36 \% 11 = 3$	$h(12) = 3$
4				
5				
6	13	$13 \times 3 = 39$	$39 \% 11 = 6$	$h(13) = 6$
7				
8				
9	14	$14 \times 3 = 42$	$42 \% 11 = 9$	$h(14) = 9$

(b)

0	$11 \leftarrow 22 \leftarrow 33 \leftarrow 44 \leftarrow 55$	$3 \times 11 = 33$	$33 \% 11 = 0$	$h(11) = h(22) =$
1		$3 \times 22 = 66$	$66 \% 11 = 0$	$= h(33) = h(44) = h(55) = 0$
2		$3 \times 33 = 99$	$99 \% 11 = 0$	
3		$3 \times 44 = 132$	$132 \% 11 = 0$	
4		$3 \times 55 = 165$	$165 \% 11 = 0$	
5				
6				
7				
8				
9				

Question 3

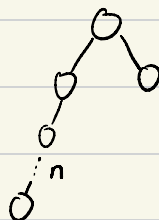
The minimum case: $2^{10} < 2013 < 2^{11}$ so the minimum height of tree is 11

The maximum case: it is infinite

for example the tree with 2 leaf node may like

so tree with 2013 leaf nodes may also

be infinite height.



Question 4

Intersection (L.Head, R.Head)

1. currentL = L.Head currentR = R.Head new_head = listnode() current = listnode()

2. new_head.next = current

3. if currentL = nullptr or currentR = nullptr

4. return nullptr

5. while currentL != nullptr and currentR != nullptr

6. if currentL.value < currentR.value

7. currentL = currentL.next

8. else if currentL.value > currentR.value

9. currentR = currentR.next

10. else { if new_head == nullptr new_head = currentL current = currentL

11. else current.next = currentL

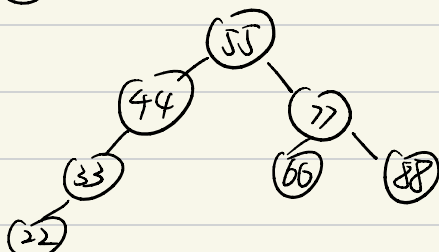
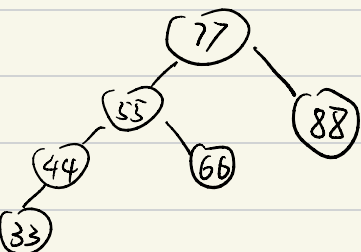
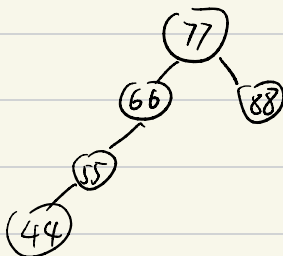
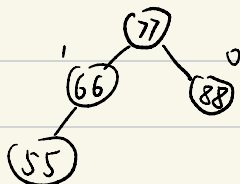
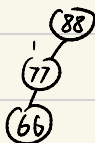
12. currentL.prev = current

current = current.next

currentR = currentR.next currentL = currentL.next }

Question 5

before
rotation



after
rotation

