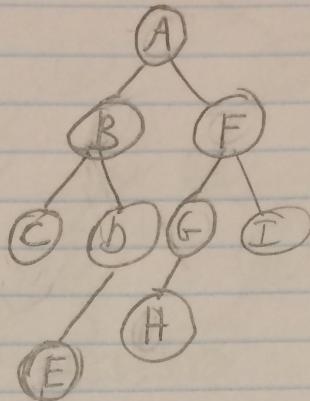


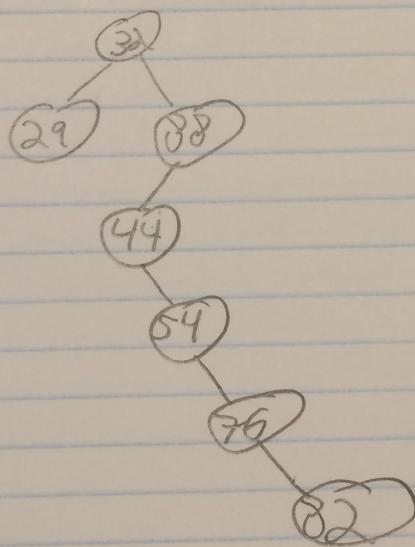
Felix Singerman - 7970742

1)

A3

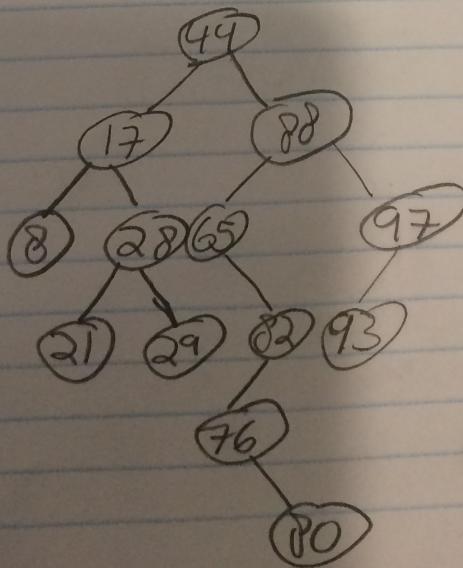


3

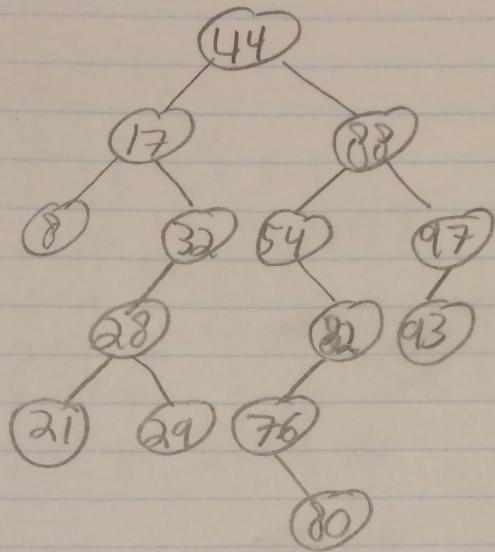


4

a1



46



6)

a)

$$3^h$$

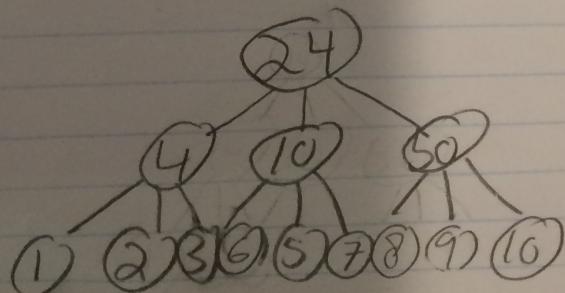
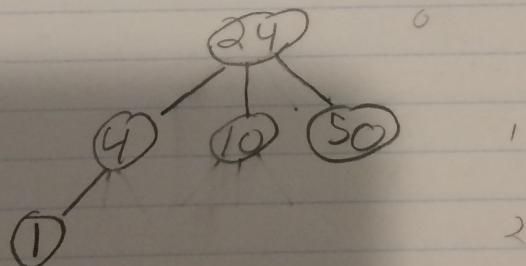
b)

$$13$$

c)

$$\sum_{h=0}^{\infty} 3^h$$

d)



5)

calculate height (node)

input: tree root node of the tree

output: +10 height of the tree

Variable left ← calculate height (node.left)

Variable right ← calculate height (node.right)

if left > right then ...

return left + 1

else left ← right then ...

return right + 1

2a) Array is [ 5, 3, 17, 10, 84, 19, 6, 22, 9 ]

Downheap(10) [ 5, 3, 17, 22, 84, 19, 6, 10, 9 ]

Downheap(17) [ 5, 3, 19, 22, 84, 17, 6, 10, 9 ]

Downheap(3) [ 5, 84, 19, 22, 3, 17, 6, 10, 9 ]

Downheap(5) [ 84, 22, 19, 10, 3, 17, 6, 5, 9 ]

6)

1) Remove Max (84) = [ 22, 10, 19, 9, 3, 17, 6, 5, 84 ]

2) Remove Max (22) = [ 19, 10, 17, 9, 3, 5, 6, 22, 84 ]

3) " " (19) = [ 17, 10, 6, 9, 3, 5, 19, 22, 84 ]

4) " " (17) = [ 10, 9, 6, 5, 3, 17, 19, 22, 84 ]

5) " " (10) = [ 9, 5, 6, 3, 10, 17, 19, 22, 84 ]

6) " " (9) = [ 6, 5, 3, 9, 10, 17, 19, 22, 84 ]

7) " " (6) = [ 5, 3, 6, 9, 10, 17, 19, 22, 84 ]

8) " " (5) = [ 3, 5, 6, 9, 10, 17, 19, 22, 84 ]

\* [ = Sorted ] \*

not highlighted = heap

2c)

$$1 \Rightarrow [5]$$

$$2 \Rightarrow [5, 3]$$

$$3 \Rightarrow [17, 3, 5]$$

$$4 \Rightarrow [17, 10, 5, 3]$$

$$5 \Rightarrow [84, 17, 5, 3, 10]$$

$$6 \Rightarrow [84, 17, 19, 3, 10, 5]$$

$$7 \Rightarrow [84, 17, 19, 3, 10, 5, 6]$$

$$8 \Rightarrow [84, 22, 19, 17, 10, 5, 6, 3]$$

$$9 \Rightarrow [84, 22, 19, 17, 10, 5, 6, 3, 9]$$