

April Li

CSDS 233

Assignment 3 Written Component

Problem 1: AVL Trees

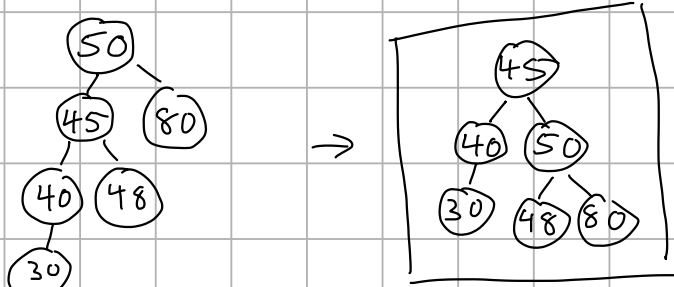
a) i. T

ii. F : AVL trees are balanced so operations like deleting will be more efficient than a regular BST. It will take $O(\log n)$ to delete a node from an AVL tree.

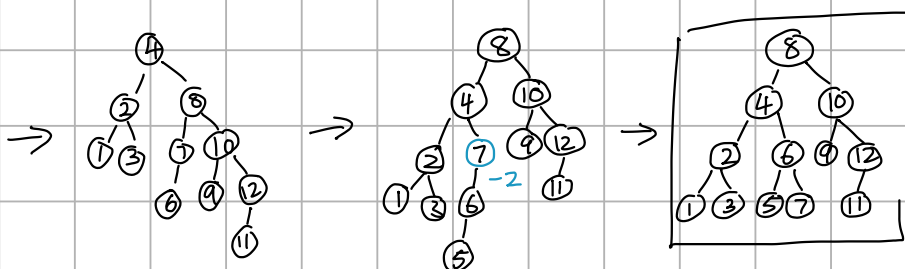
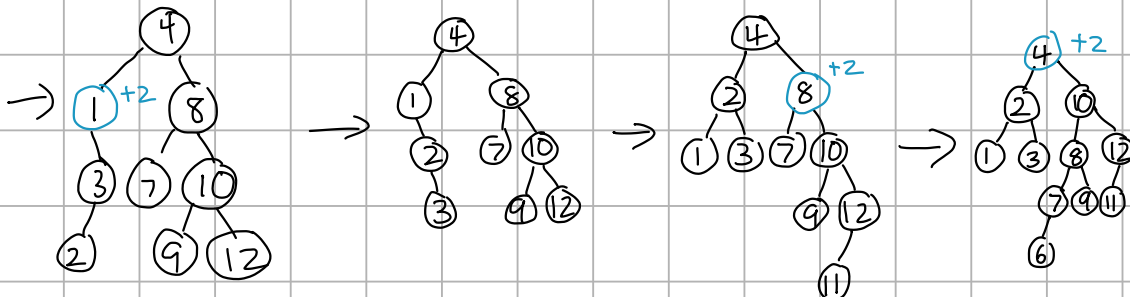
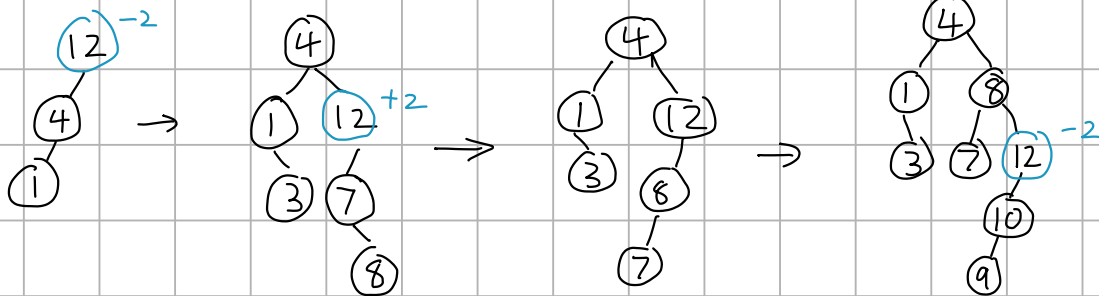
b) i. -2

ii. 1

iii.



c)



Problem 2: B Trees

a) i. F: B-Tree nodes must have at least $t-1$ keys & at most $2t-1$ keys

ii. T

b) i. min children: $t = 5$

max children: $2t = 10$

ii. min keys: $t-1 = 4$

max keys: $2t-1 = 9$

iii. $\begin{matrix} \times & \times & \times & \times & \times & \times & \times & \times & \times & \times \\ 4, & 9, & 32, & 12, & 24, & 30, & 51, & 29, & 69, & 31, & 90, & 70, & 75, & 79, & 80, & 85, & 91 \end{matrix}$

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4	9	12	24	29	30	32	51	69
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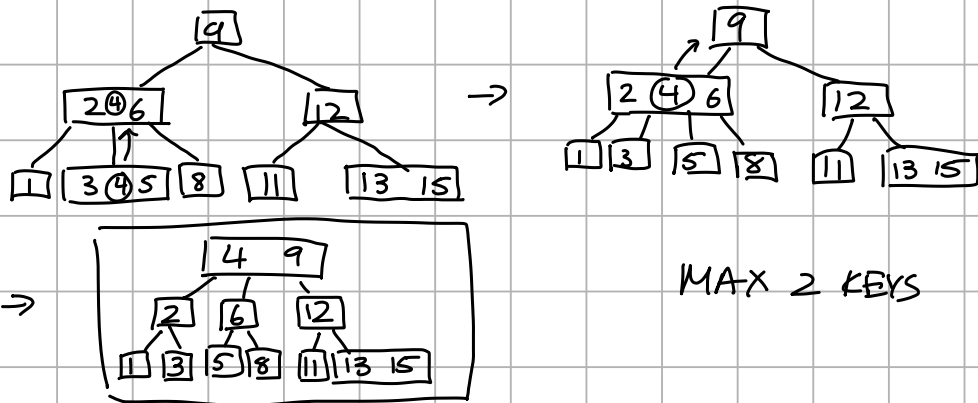
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4 9 12 24				29	30 31 32 51 69 70 75 79 90				
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4 9 12 24				29 69		30 31 32 51 70 75 79 80 85 90 91				
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c) i.



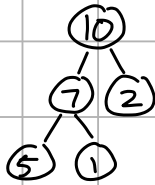
ii. $O(\log n)$

Problem 3: Heaps

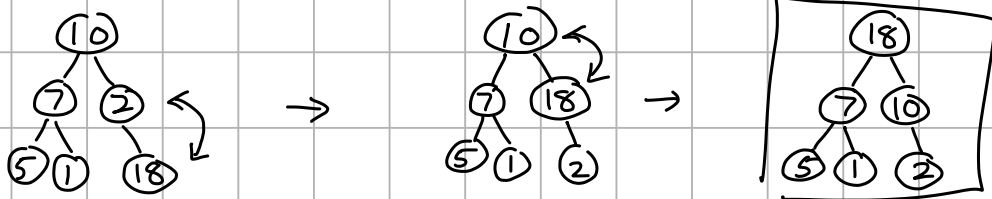
a) i. T

ii. F. The worst time complexity for a heap sort is $O(\log n)$ for when the elements are in reverse order

b) i.



ii.



iii.

