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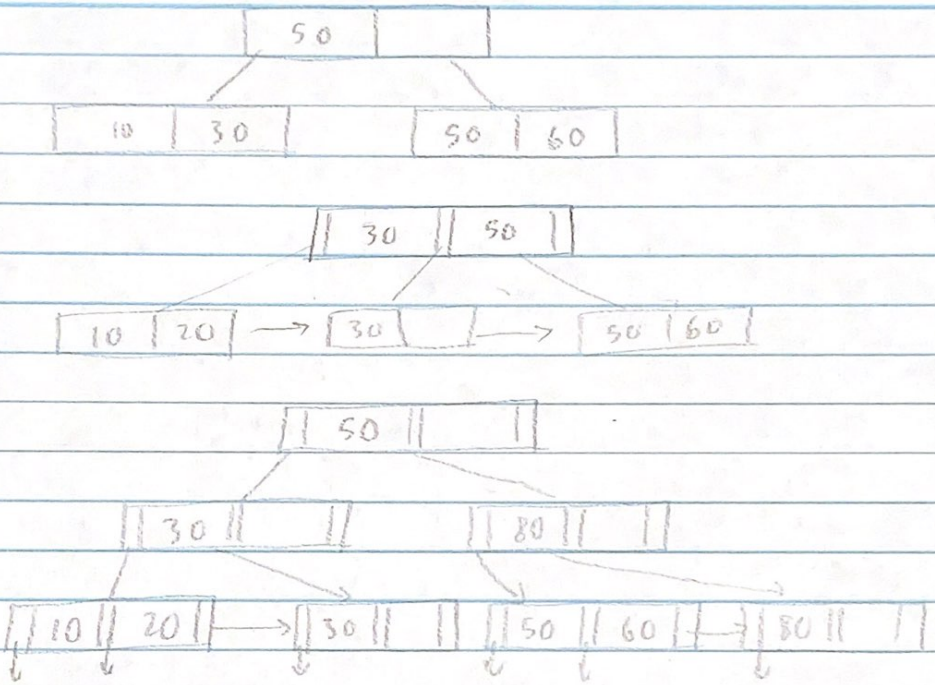
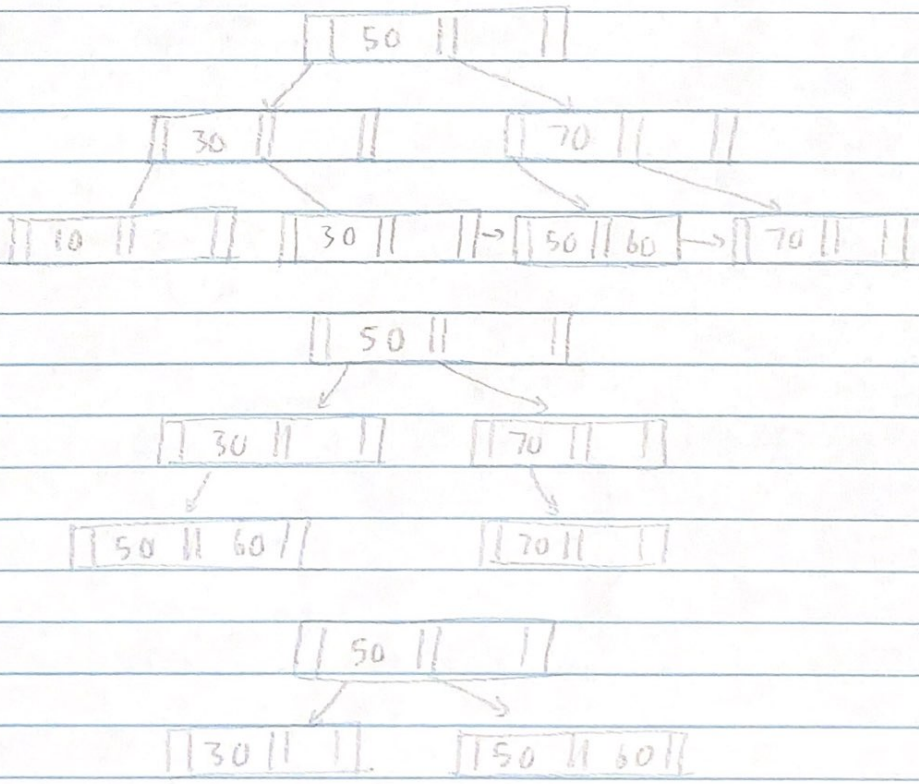
11/18/21

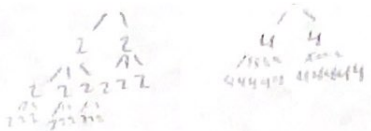
CS 143 HW6

1. a)



b)





2. 300 records $n=5$

At least: Leaf: 2 keys, 3 pointers || 4 keys, 5 pointers

Non-leaf: 2 keys, 3 pointers || 4 keys, 5 pointers

Root: 1 key, 2 pointers || 2 keys, 2 pointers

At most

min 4

Minimum:

① Leaf $\lceil 300/4 \rceil = 75$

② $\lceil 75/5 \rceil = 15$

③ $\lceil 15/5 \rceil = 3$

④ Root Node

Min: 4 layers

Maximum:

① Leaf $\lfloor 300/2 \rfloor = 150$

② $\lfloor 150/3 \rfloor = 50$

③ $\lfloor 50/3 \rfloor = 16$

④ $\lfloor 16/3 \rfloor = 5$

⑤ $\lfloor 5/3 \rfloor = 1$ (Root Node)

Max 5 layers

3. $h(n) = n \bmod 256$ 8-bit hash key

n	n % 256	binary	
106	106	01101010	✓
115	115	01110011	✓
916	148	10010100	
0	0	00000000	✓
96	96	01100000	✓
126	126	01111110	✓
16	16	00010000	✓
15	15	00001111	✓
31	31	00011111	✓