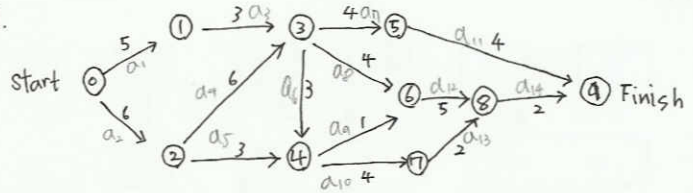
Data structure Assignment7. 20121324 오주영 Delay chance 사용.

<1> 6.5.2.



activity	early time e	late time l	l-e	Critical (l-e)=0
a_1	0	4	4	N
a_2	0	0	0	Y
a_3	5	9	4	N
a_4	6	6	0	Y
a_5	6	11	5	N
a_6	12	12	0	Y
a_7	12	12	0	Y
a_8	12	12	0	Y
a_9	15	15	0	Y
a_{10}	15	15	0	Y
a_{11}	16	17	1	N
a_{12}	16	16	0	Y
a_{13}	19	19	0	Y
a_{14}	19	19	0	Y

(a) 21

(b) $a_2, a_4, a_6, a_7, a_8, a_9, a_{10}, a_{12}$ a_{13}, a_{14}

(c) Speed-up critical path.

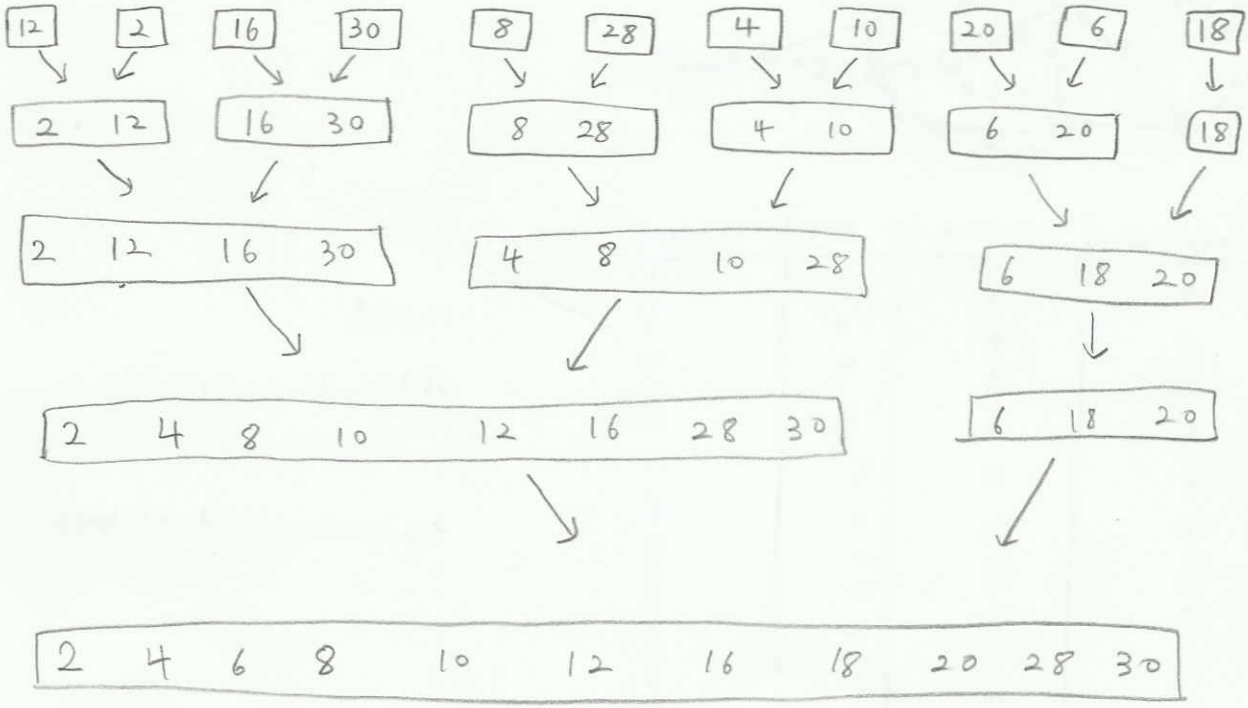
<2>

7.3.1 Draw a figure. with the list (12, 2, 16, 30, 8, 28, 4, 10, 20, 6, 18)

R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8	R_9	R_{10}	R_{11}	left	right
[12	2	16	30	8	28	4	10	20	6	18]	1	11
[4	2	6	10	8]	12	[28	30	20	16	18]	1	5
[2]	4	[6	10	8]	12	[28	30	20	16	18]	1	1
2	4	[6	10	8]	12	[28	30	20	16	18]	3	5
2	4	6	[10	8]	12	[28	30	20	16	18]	4	5
2	4	6	8	10	12	[28	30	20	16	18]	7	11
2	4	6	8	10	12	[16	18	20]	28	[30]	7	9
2	4	6	8	10	12	16	[18	20]	28	[30]	8	9
2	4	6	8	10	12	16	18	20	28	[30]	11	11
2	4	6	8	10	12	16	18	20	28	30		

<3>

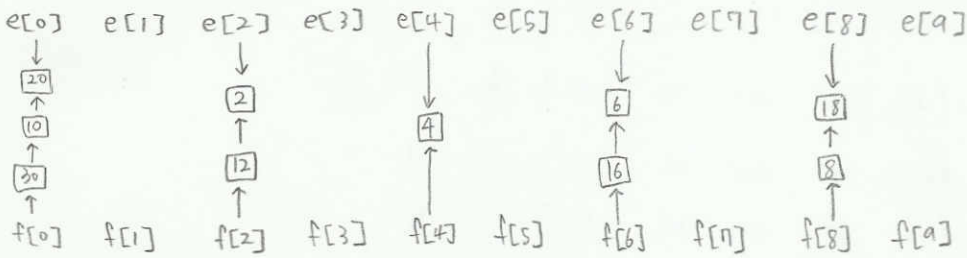
11.5.1 write the states of the list (12, 2, 16, 30, 8, 28, 4, 10, 20, 6, 18) at the end of each phase of MergeSort. n=11.



<4>

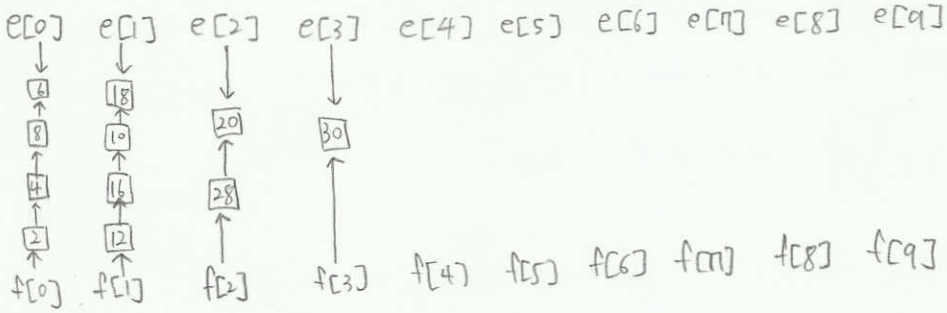
11.11.1 write the status of the list (12, 2, 16, 30, 8, 28, 4, 10, 20, 6, 18) at the end of each pass of RadixSort. Use r=10.

ⓐ First-pass queues and resulting chain



∴ 30→10→20→12→2→4→16→6→8→18

ⓑ Second-pass queues and resulting chain.



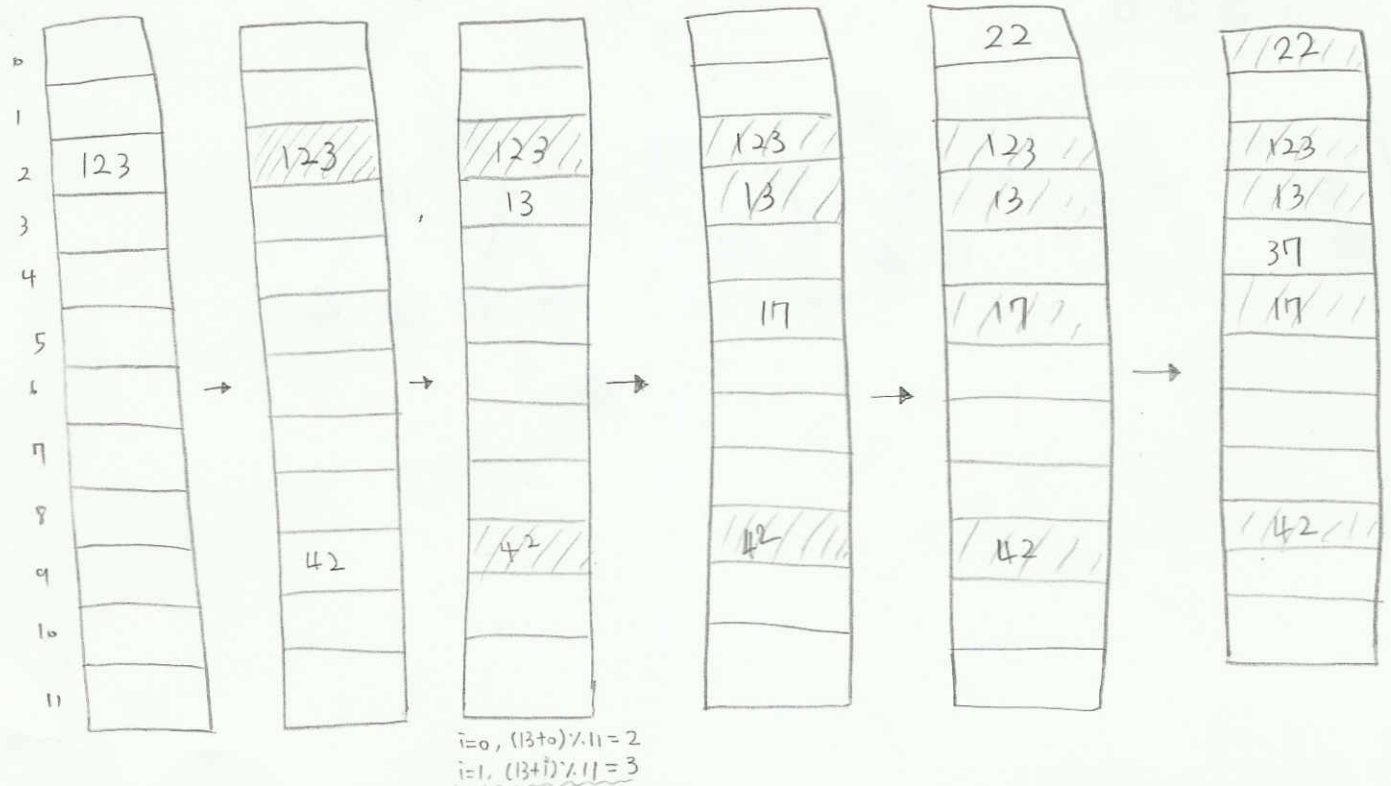
∴ 2→4→8→6→12→16→10→18→28→20→30

<5> hash table of length b = 11 with a single slot per bucket. $h(k) = k \% b$

Inserting the keys : 123, 42, 13, 17, 22, 37 → $f(i) = i^2$

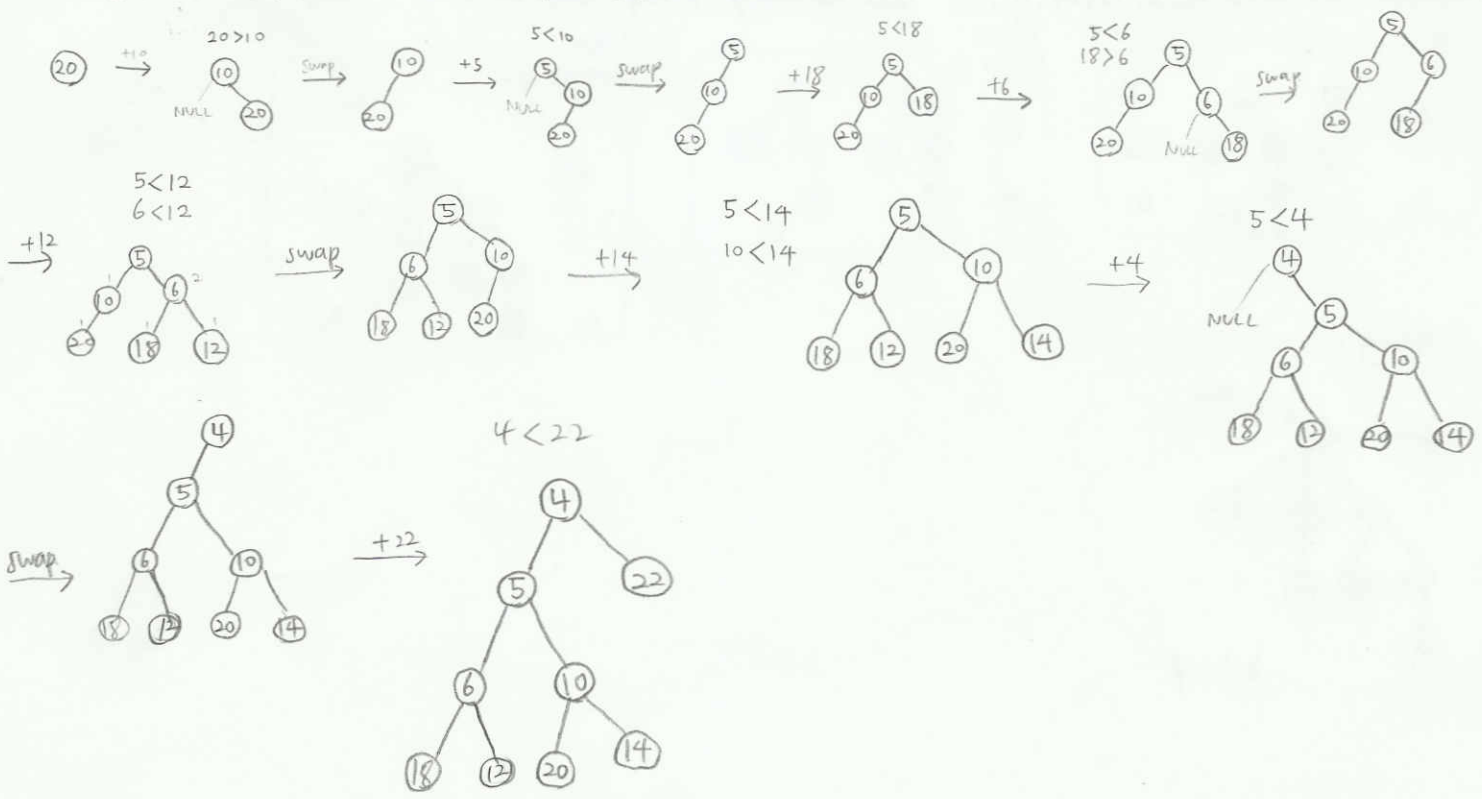
Draw the hash table using quadratic probing to resolve overflow.

h(123) = 2, h(42) = 9, h(13) = 2, h(17) = 5, h(22) = 0, h(37) = 4

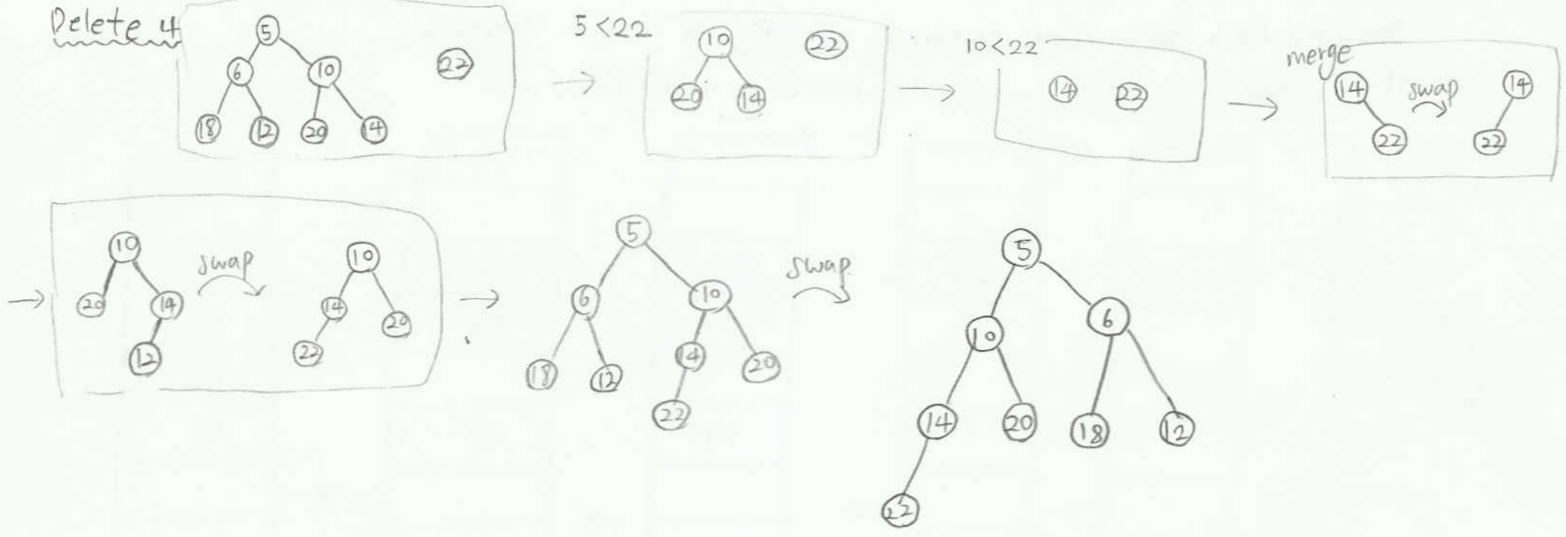


<6> 9.2.3.

(a) Insert 20, 10, 5, 18, 6, 12, 14, 4, 22 in empty min leftist tree.

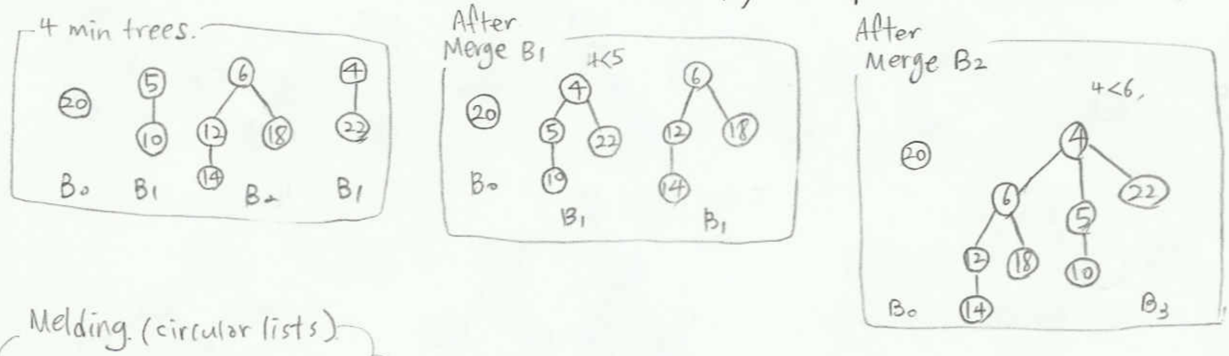


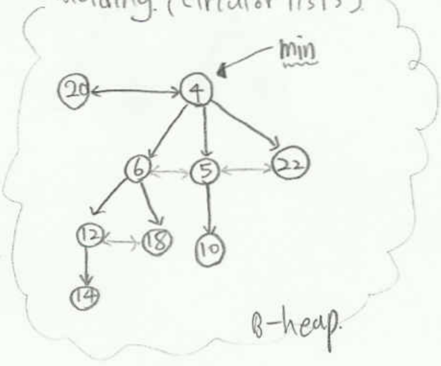
(b) Delete the min element from the final min leftist tree of part (a). Show the resulting min leftist tree.



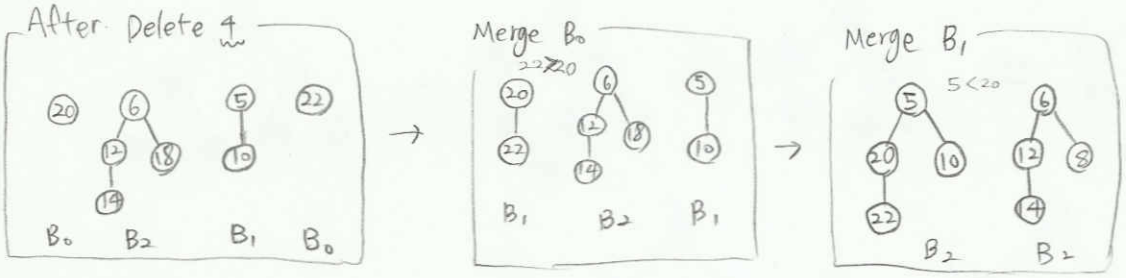
<7> 9.3.3.

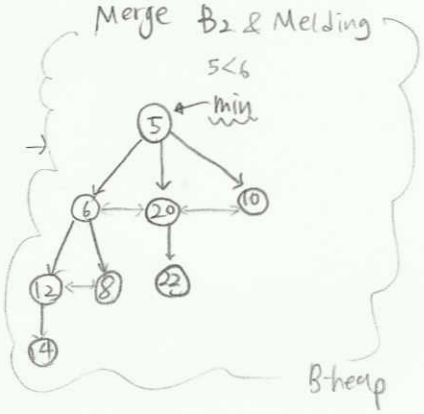
(a) Insert 20, 10, 5, 18, 6, 12, 14, 4, 22 into an empty B-heap. Show the final B-heap.





(b) Delete the min element from the final B-heap of part(a).
Show the resulting B-heap. Show how you arrived at this final B-heap.





<8> 9.4.7 (Proove)

(a) $F_h = \sum_{k=0}^{h-2} F_k + 1$, $h>1$.

- $F_0 = 1$, $F_1 = 2$
- $F_k = F_{k-1} + F_{k-2} \rightarrow F_k - F_{k-1} = F_{k-2}$

$F_k - F_{k-1} = F_{k-2}$
$F_{k-1} - F_{k-2} = F_{k-3}$
$F_{k-2} - F_{k-3} = F_{k-4}$
⋮
$F_4 - F_3 = F_2$
$F_3 - F_2 = F_1$
$F_2 - F_1 = F_0$

$F_k - F_0 = F_0 + \cdots + F_{k-2}$
$F_k = F_0 + \sum_{k=0}^{k-2} F_k$
$\therefore F_h = \sum_{k=0}^{h-2} F_k + 1$

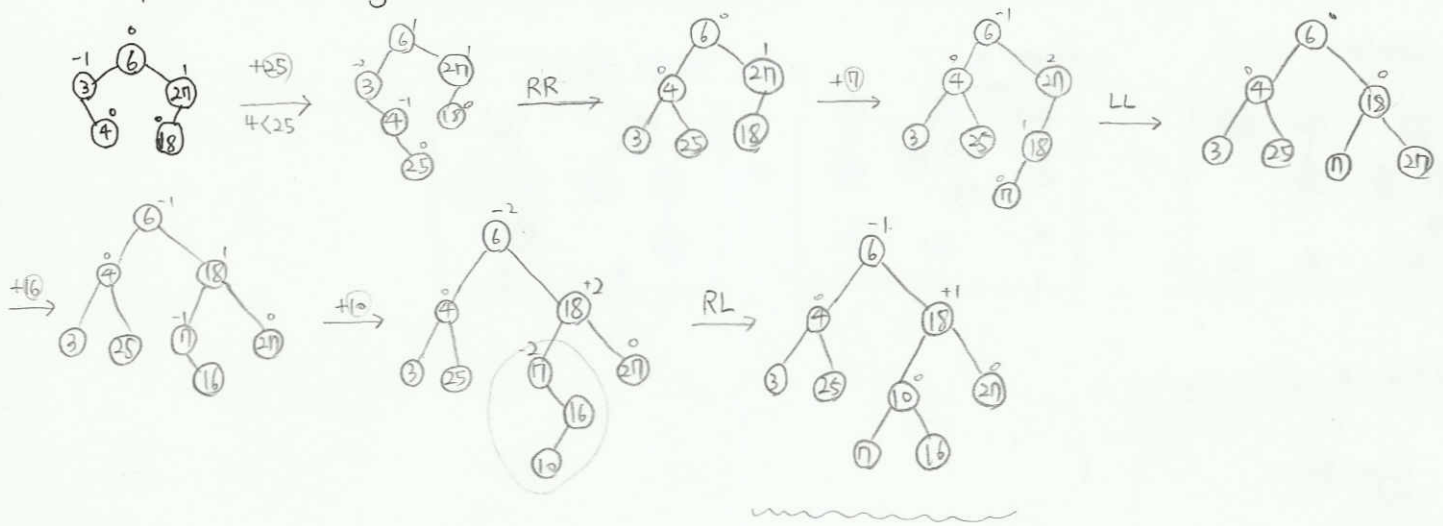
(b)

(c) $F_k = \frac{1}{\sqrt{5}}\left(\frac{1+\sqrt{5}}{2}\right)^k - \frac{1}{\sqrt{5}}\left(\frac{1-\sqrt{5}}{2}\right)^k$, $k \geq 0$

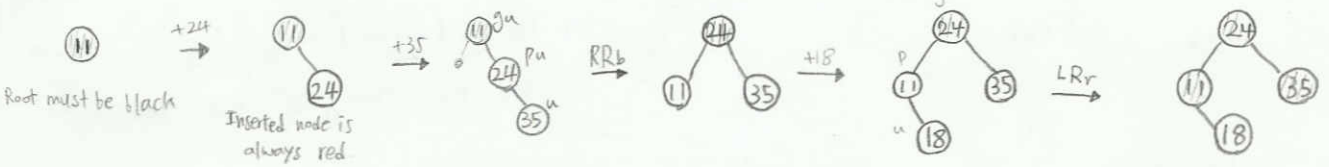
Show that $F_{k+2} \geq \phi^k$, $k \geq 0$, $\phi = \frac{1+\sqrt{5}}{2}$

- $F_0 = 1$, $F_1 = 2$
- $F_{k-1} = \frac{1}{\sqrt{5}}\left(\frac{1+\sqrt{5}}{2}\right)^{k-1} - \frac{1}{\sqrt{5}}\left(\frac{1-\sqrt{5}}{2}\right)^{k-1}$, $k \geq 0$

<9> Insert 25, 7, 16, 10 into the AVL tree shown below.
Draw the resulting tree after each step. (with the balance factors).



<10> Insert 11, 24, 35, 18, 7, 43 into an initially empty red-black tree. ● : Black. ○ : red.



Root color is not changed.