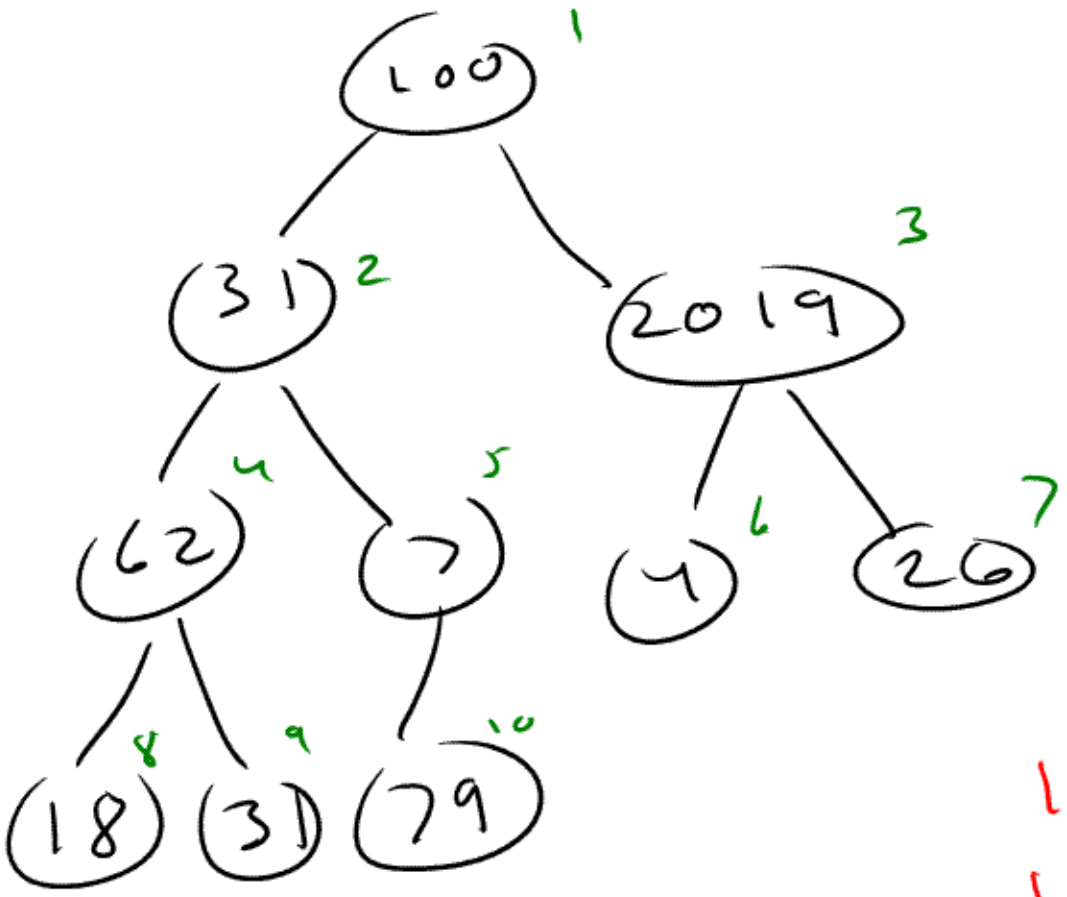


i

$Left\text{-}Child(i) = 2i$

$Right\text{-}Child(i) = 2i+1$

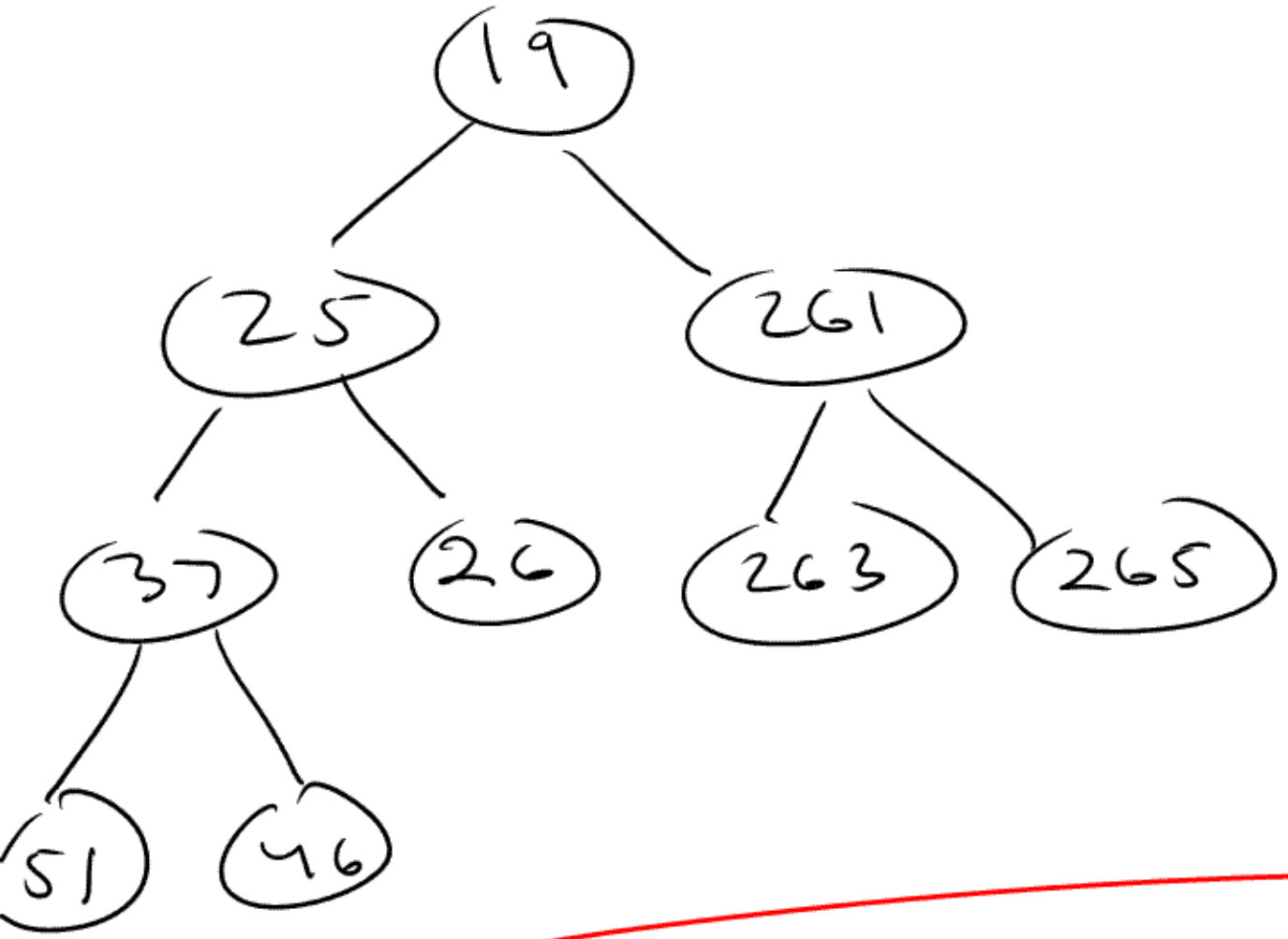
$Parent(i) = \lfloor i/2 \rfloor$

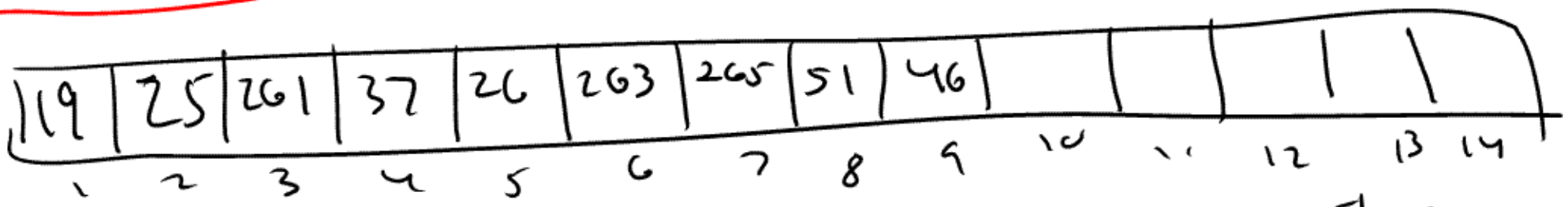
$110 \rightarrow 11$

1100

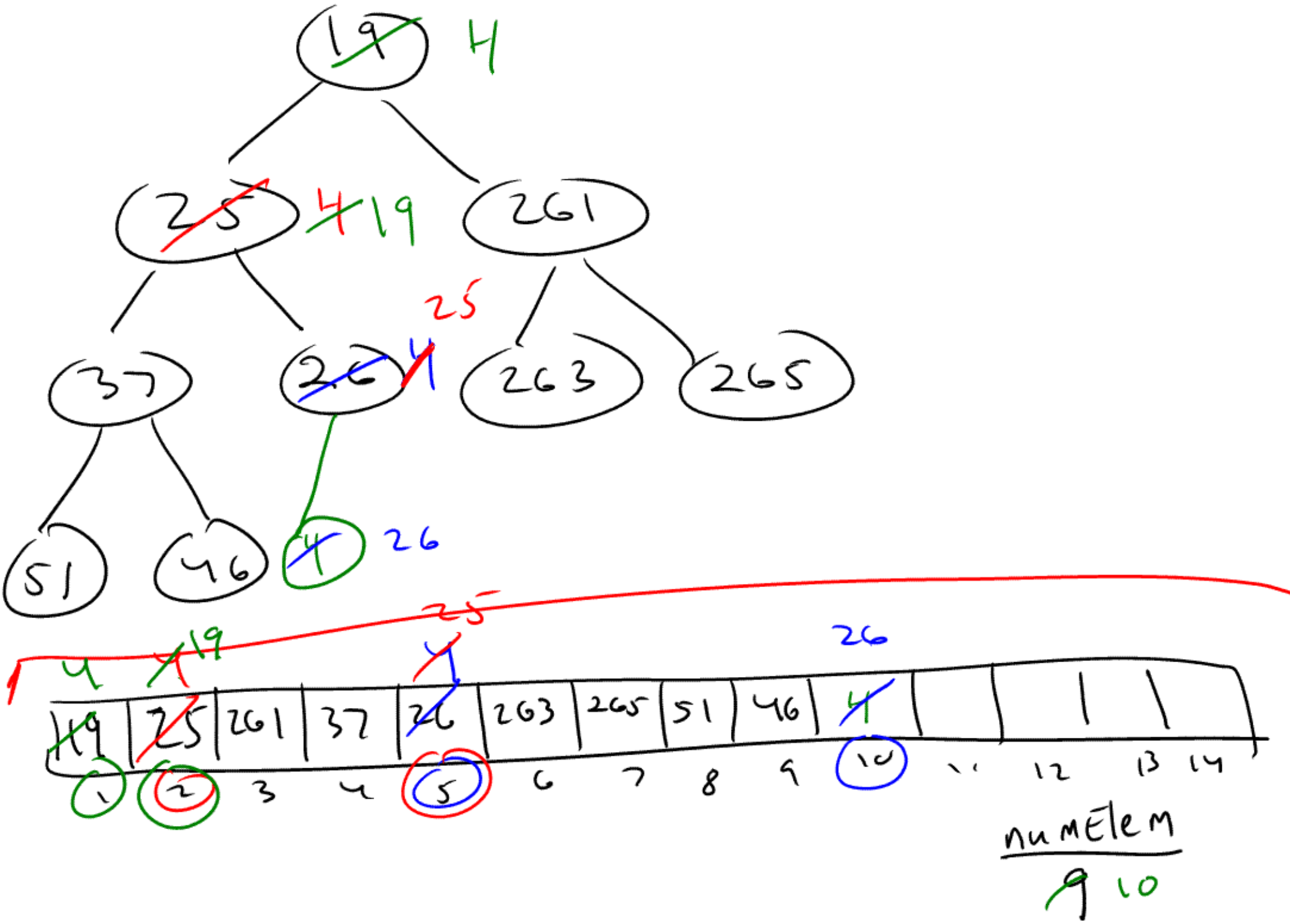
1101

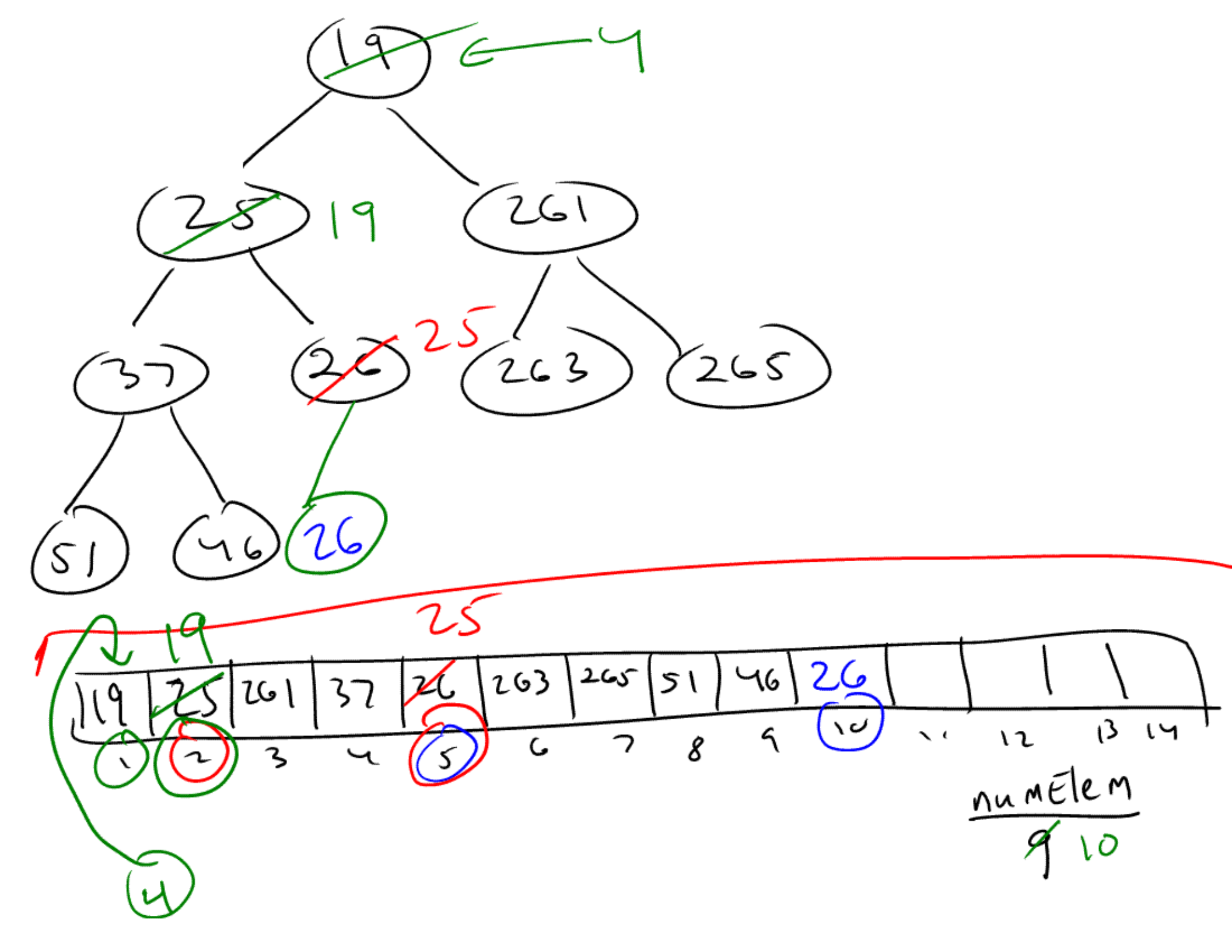
100	31	2019	62	7	4	20	18	31	79
1	2	3	4	5	6	7	8	9	10

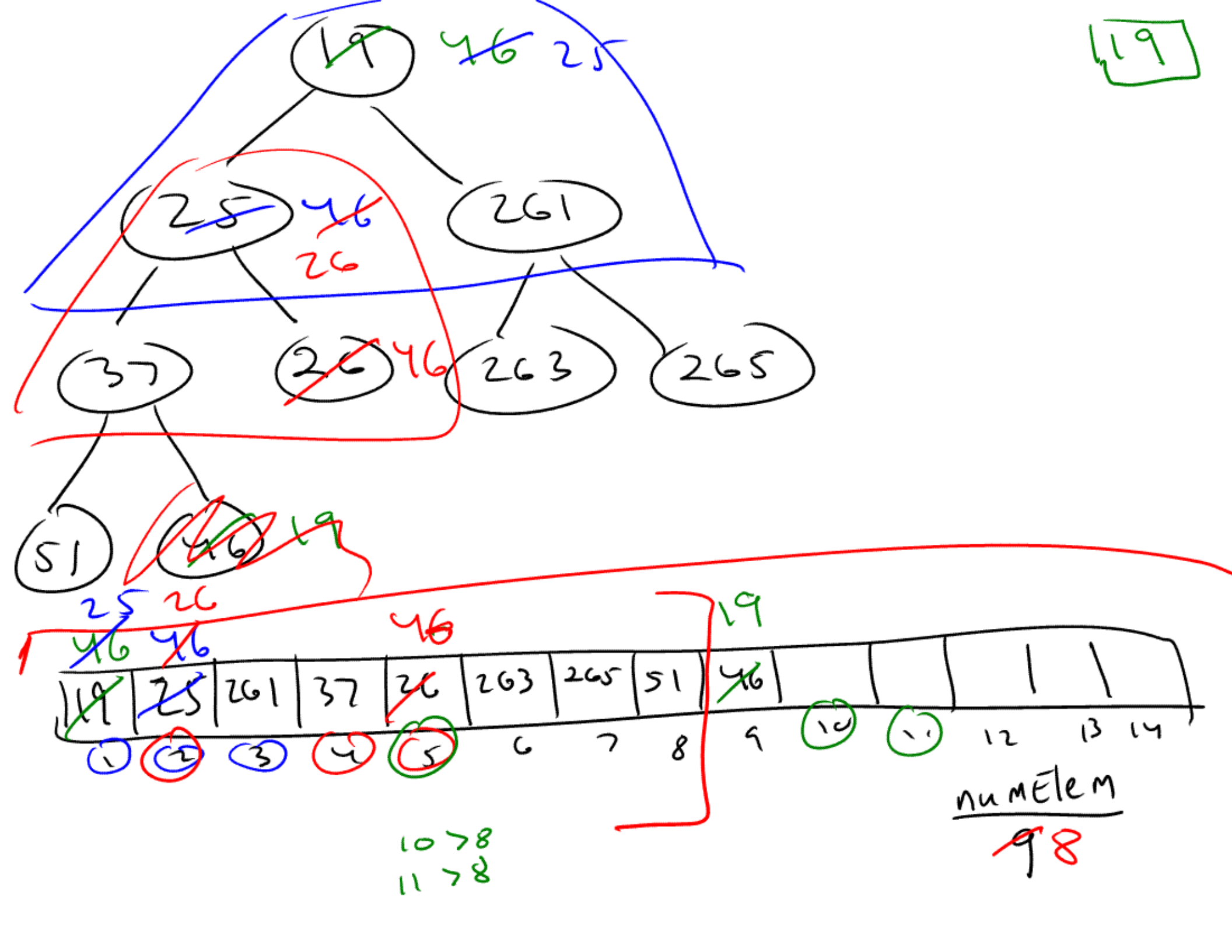

19
25
261
37
26
263
265
51
46

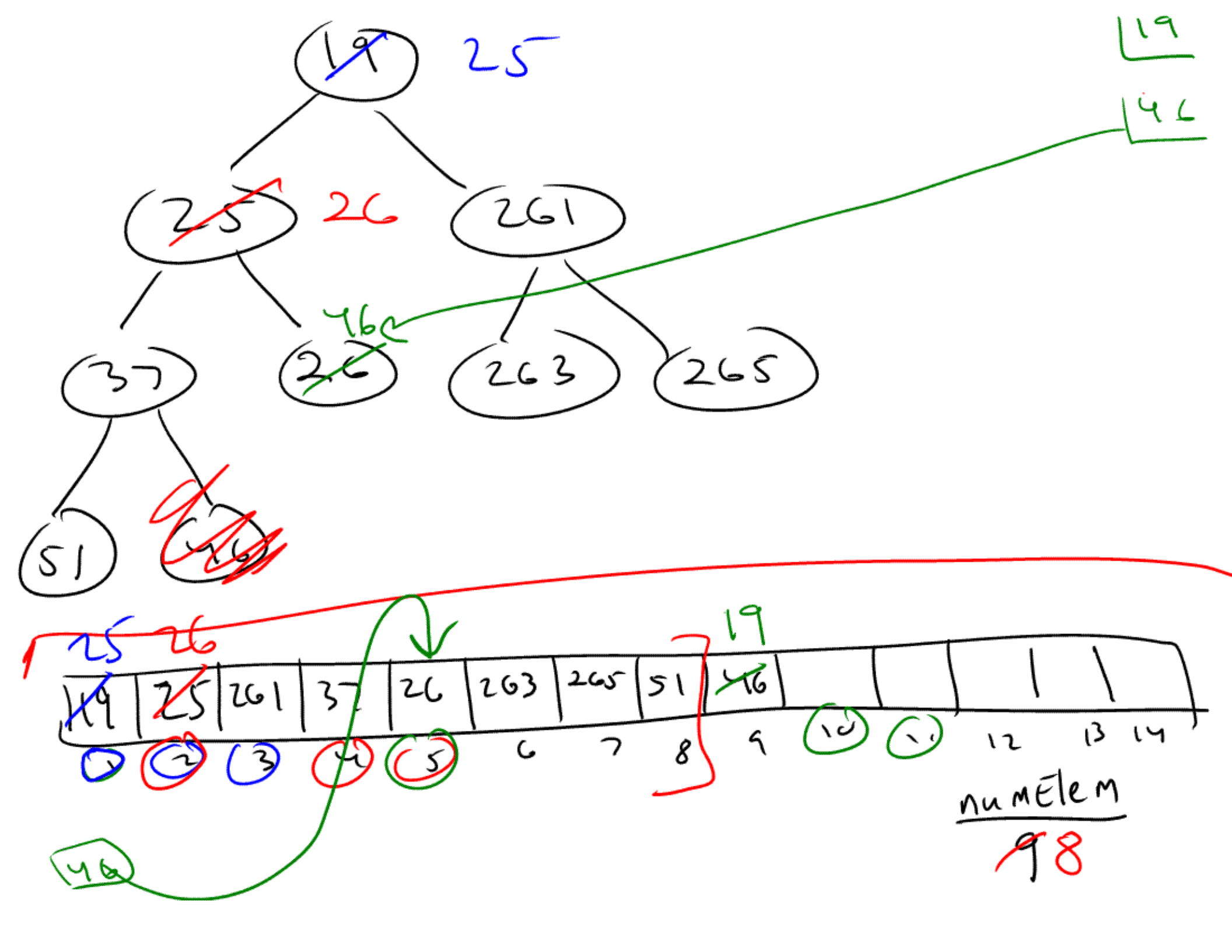

19
25
261
37
26
263
265
51
46
1
2
3
4
5
6
7
8
9
10
11
12
13
14

numElem
9


19
25
261
37
26
263
265
51
46
4
19
25
26
19
25
261
37
26
263
265
51
46
4
1
2
3
4
5
6
7
8
9
10
11
12
13
14
numElem
9
10


19
25
261
37
26
263
265
51
46
26
25
19
4
1
2
3
4
5
6
7
8
9
10
11
12
13
14
numElem
9 10


19
25
261
37
26
263
265
51
46
19
25
26
46
46
46
19
261
37
263
265
51
46
19
1
2
3
4
5
6
7
8
9
10
11
12
13
14
10 > 8
11 > 8
numElem
98

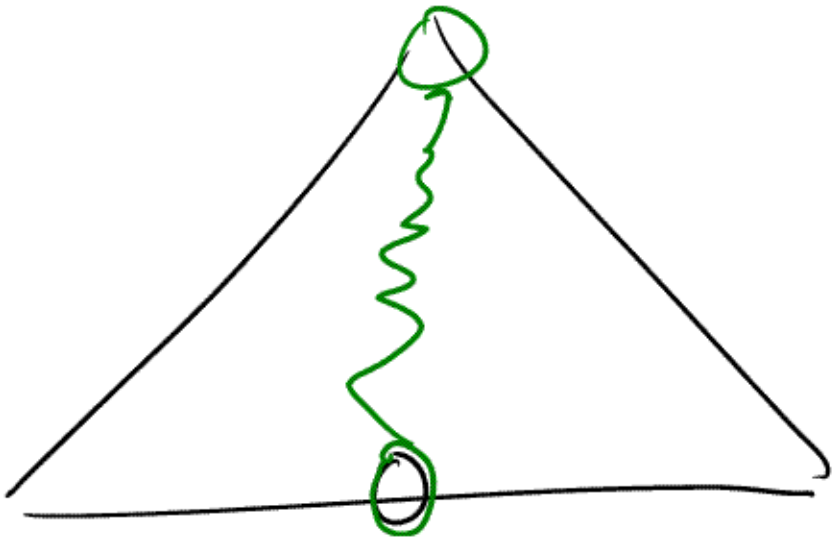

19
25
26
261
37
26
263
265
51
46
19
46
25
26
19
19
25
261
37
26
263
265
51
46
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
numElem
98

Analysis

IsEmpty : $O(1)$

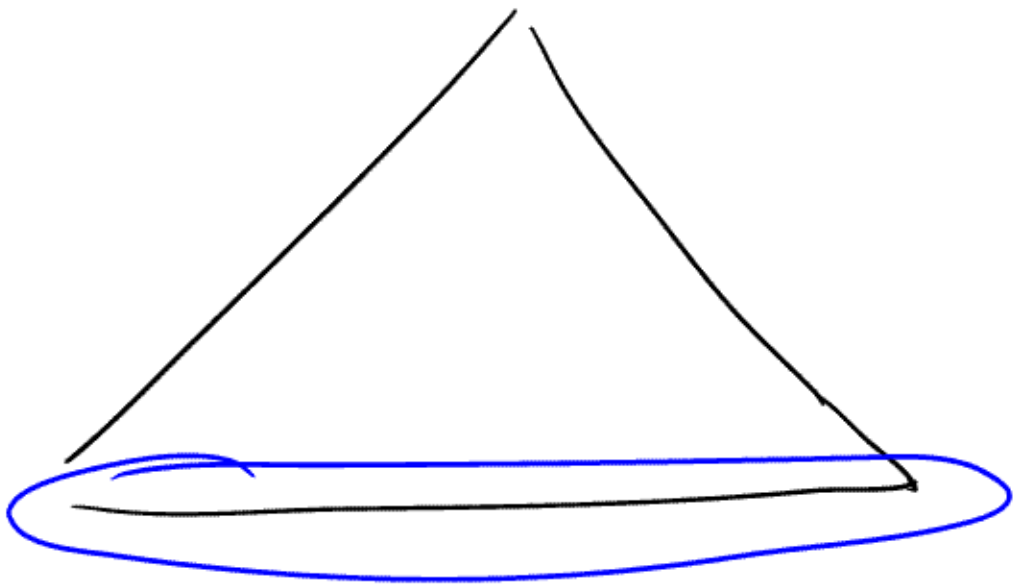
FindMin : $O(1)$

insert worst case

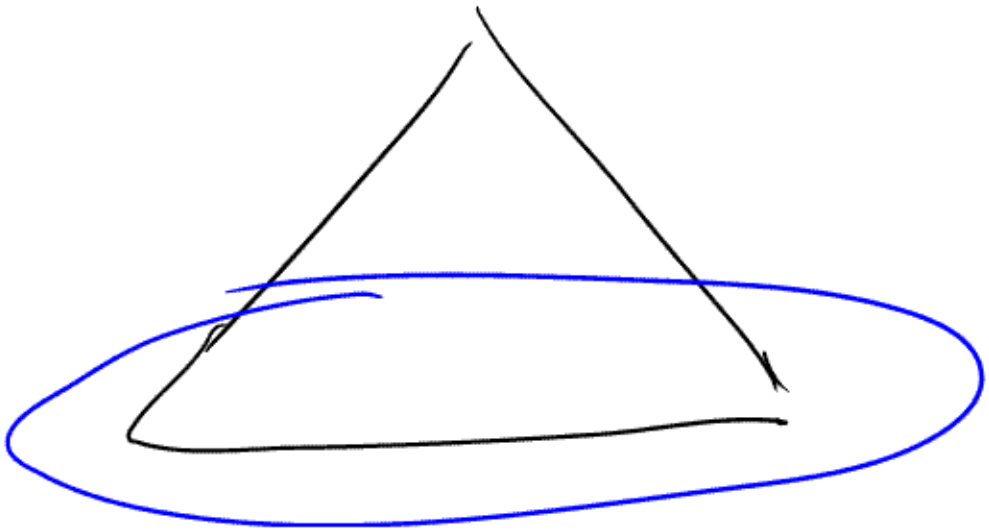


wc $O(\lg n)$

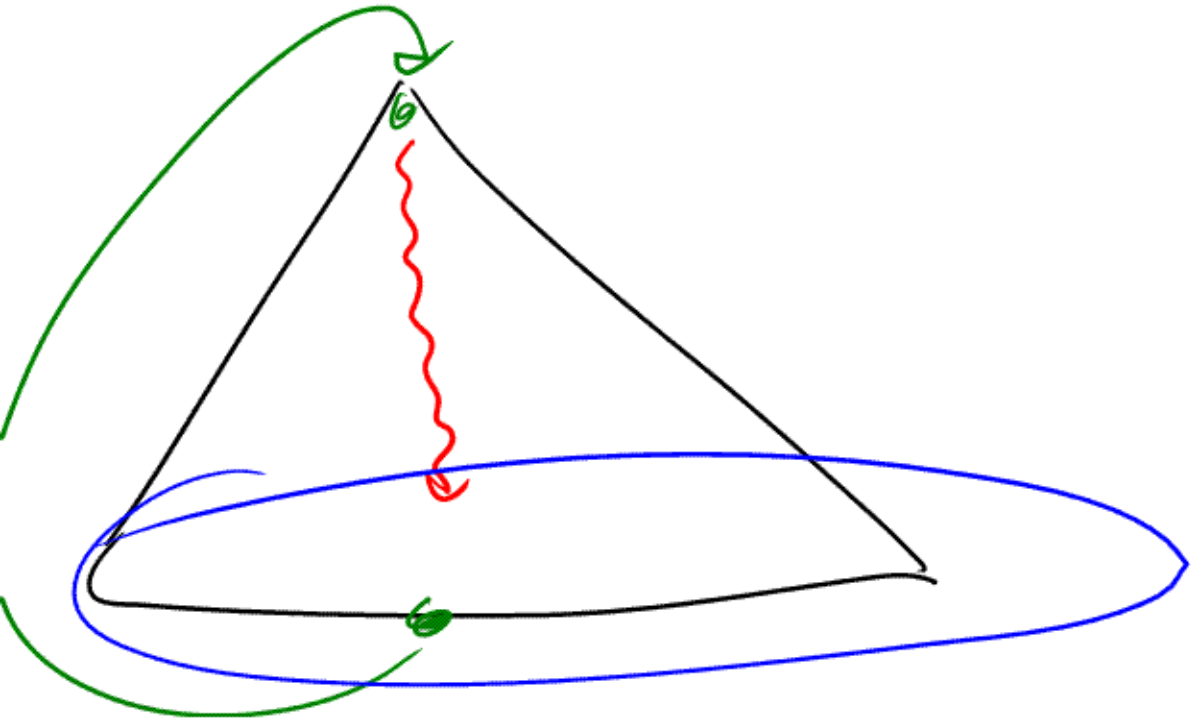
insert avg case avg: O(1)



perfect tree
>50% of values in bottom level



complete tree
>50% of values in bottom two levels



DeleteMin

wc & avgcase

$O(\lg n)$

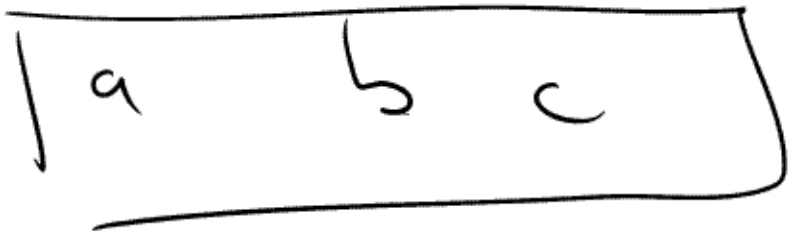
Disjoint Sets

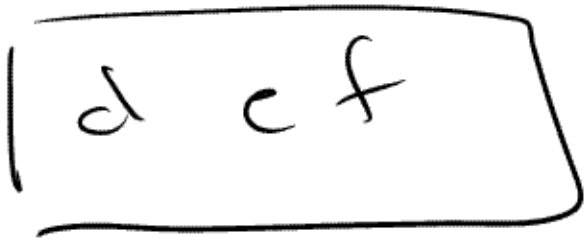
$\equiv 0$	$\equiv 3$
$\equiv 1$	$\equiv 4$
$\equiv 2$	$\equiv 5$

$$S_1 \cup S_2 \cup S_3 \cup S_4 \cup \dots \cup S_n = \cup$$

$$S_i \cap S_j = \phi$$

if $i \neq j$

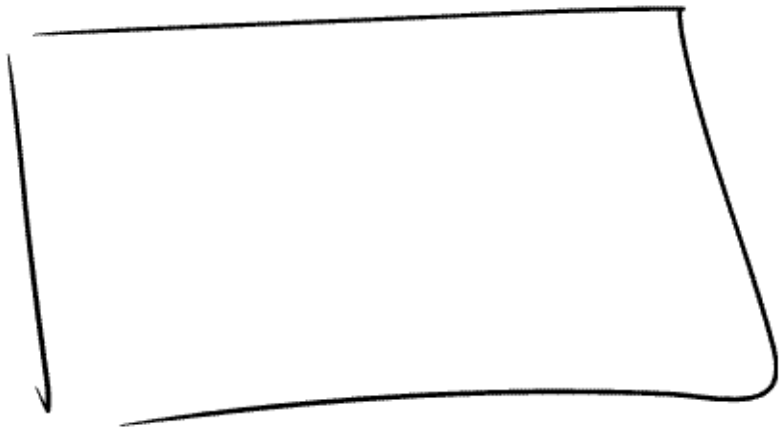




aRa aRb aRc

bRa bRb bRc

cRa cRb cRc



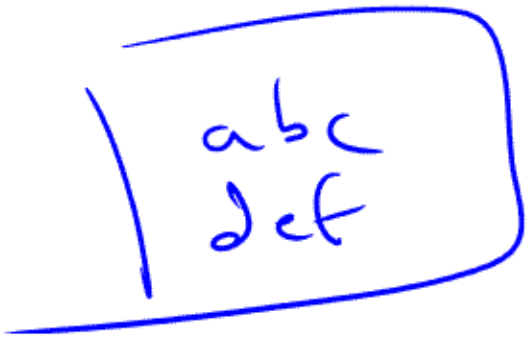
add aRd

↳ dRa

eRd, dRa → eRa

aRe

etc.



void Union (Set A, Set B)

Set Find (element x)

↳ to see if aRb,

Find(a) == Find(b)

add aRb

↳ Union(Find(a), Find(b));

up-tree