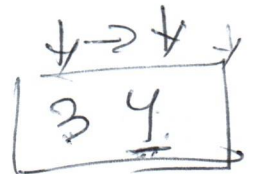
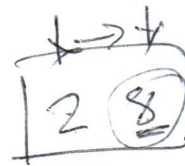
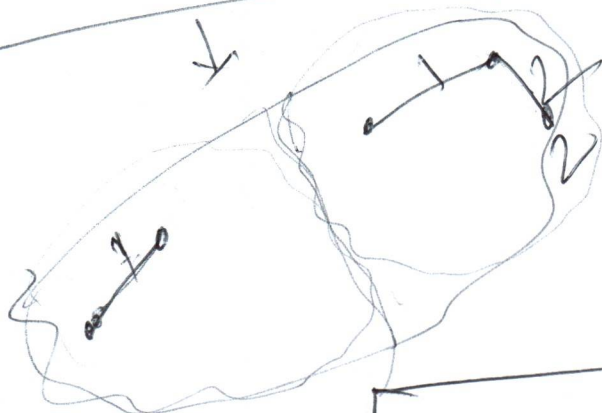
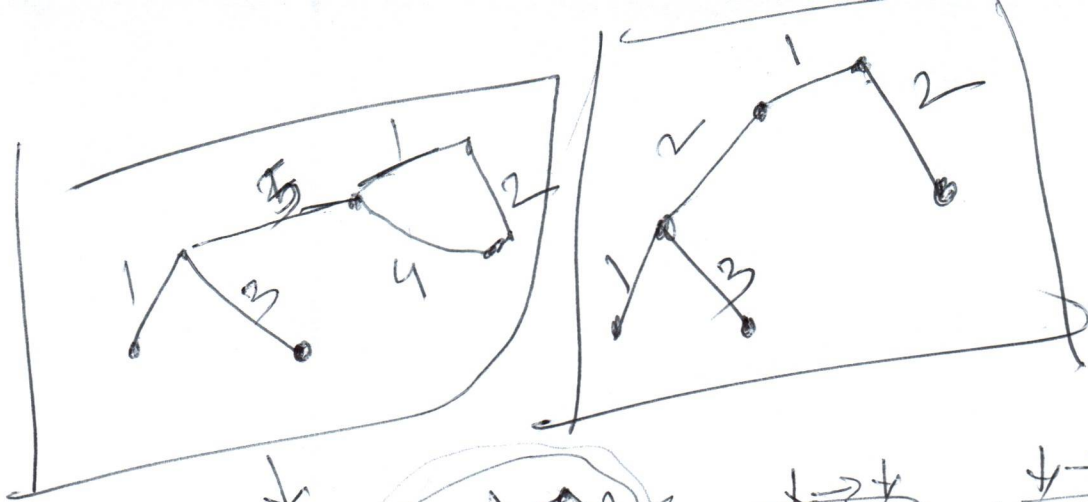


App4



2 3 4 5

Merge Sort (a, n)

$O(1)$ $\{c\}$ $n=1$, return a_1

$O(n)$ $\begin{cases} a_L = a_1, a_2, \dots, a_{\lfloor \frac{n}{2} \rfloor} \\ a_R = a_{\lfloor \frac{n}{2} \rfloor + 1}, \dots, a_n \end{cases}$

MERGE (MergeSort($a_L, \lfloor \frac{n}{2} \rfloor$),

$\uparrow$
 $O(n)$

MergeSort($a_R, n - \lfloor \frac{n}{2} \rfloor$)

$\rightarrow [n]$

$T(n) \stackrel{\text{def}}{=} \text{max. runtime of MergeSort on ALL possible inputs.}$

$$T(n) \leq O(1) + O(n) + T(\lfloor \frac{n}{2} \rfloor) + T(n - \lfloor \frac{n}{2} \rfloor) + O(n)$$

$\text{floor}(4.5)$

$= \lfloor 4.5 \rfloor$

$= 4$

$\text{ceiling}(4.5)$

$= \lceil 4.5 \rceil$

$= 5$