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# DisJoint Sct

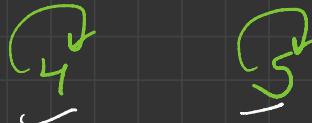


2 inp

↳ findParent() or findSct()

↳ Union() or UnionSct()

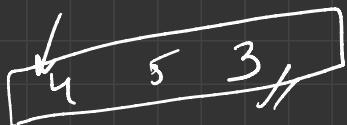
5 disconnected comp



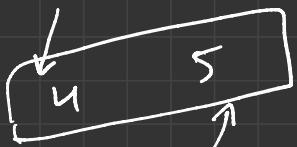
Union (1, 2)



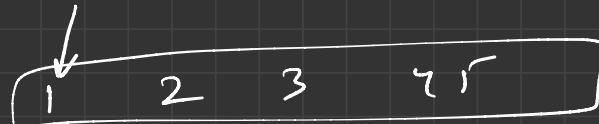
Union(3, 5)



Union (4, 5)



Union (1, 3)



find parent (1)  $\rightarrow 1$

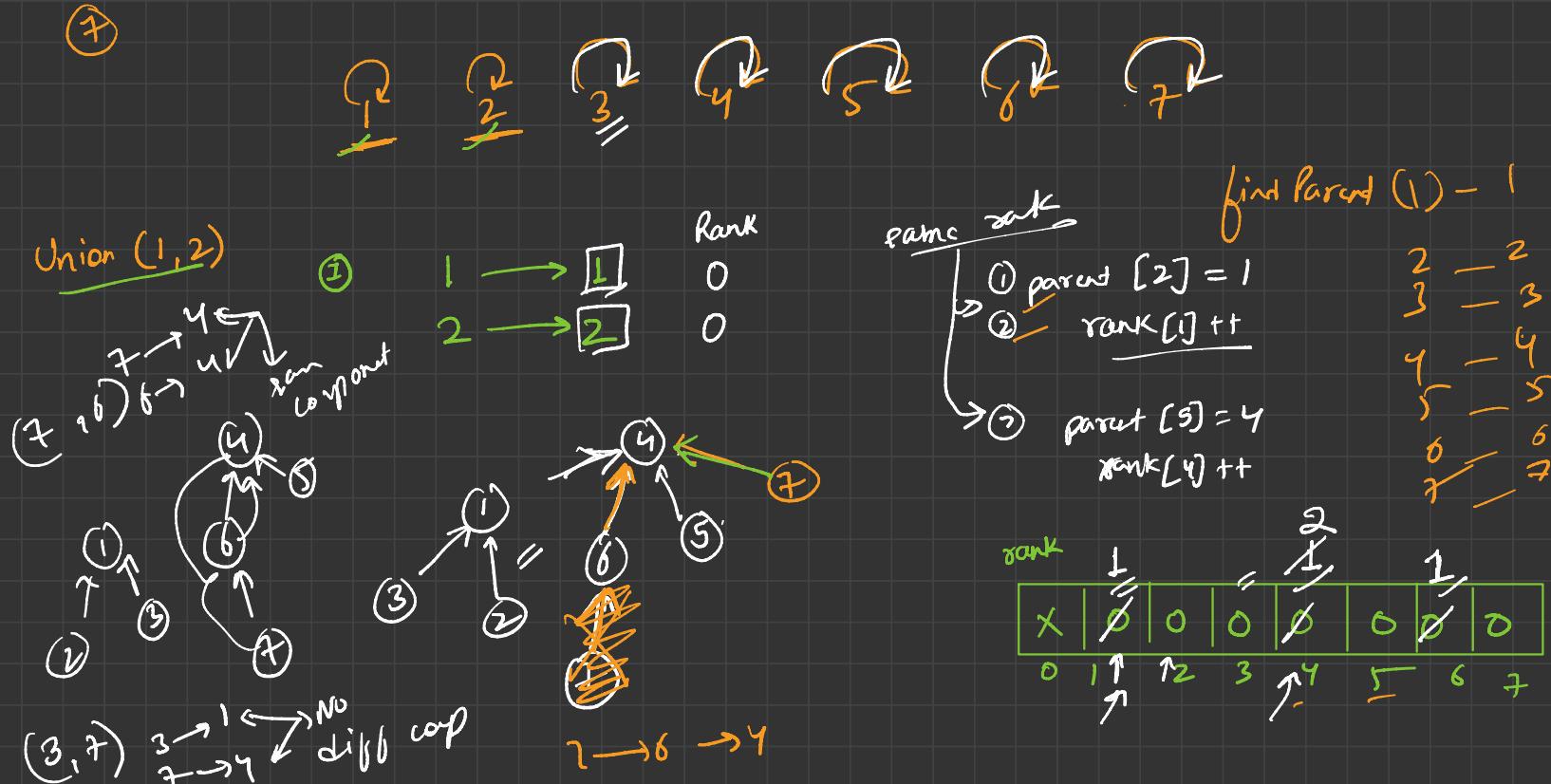
(2)  $\rightarrow 2$

(3)  $\rightarrow 3$

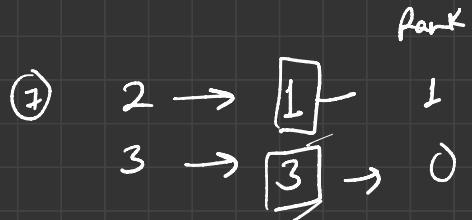
(4)  $\rightarrow 4$

(5)  $\rightarrow 5$

# Union by Rank & Path Compression



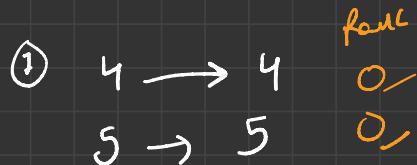
Union (2, 3)



rank [3] < rank [1]

parent [3] = 1

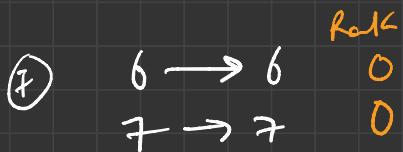
Union (4, 5)



parent [7] = 6

rank [6] ++

Union (6, 7)



Union (5, 6)



parent [6] = 4

rank [4] ++

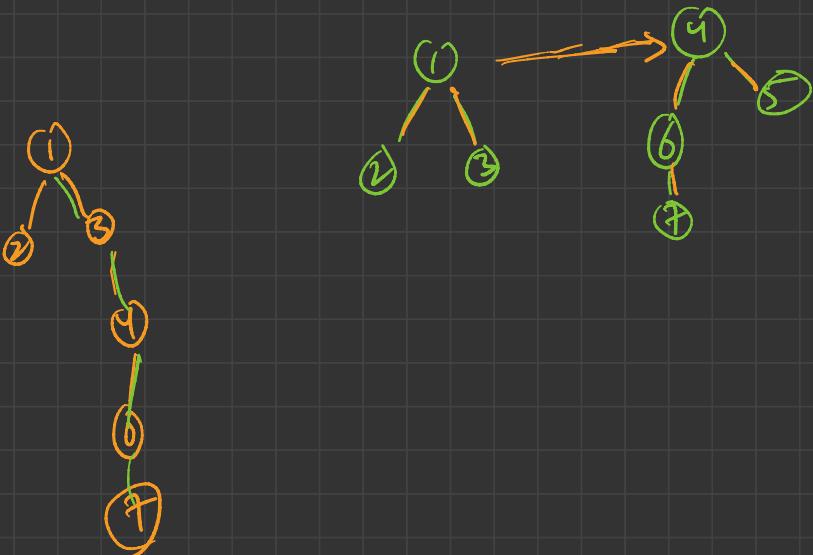
Union  $(3, 7)$  ①

$3 \rightarrow \begin{matrix} 1 \\ 1 \end{matrix}$

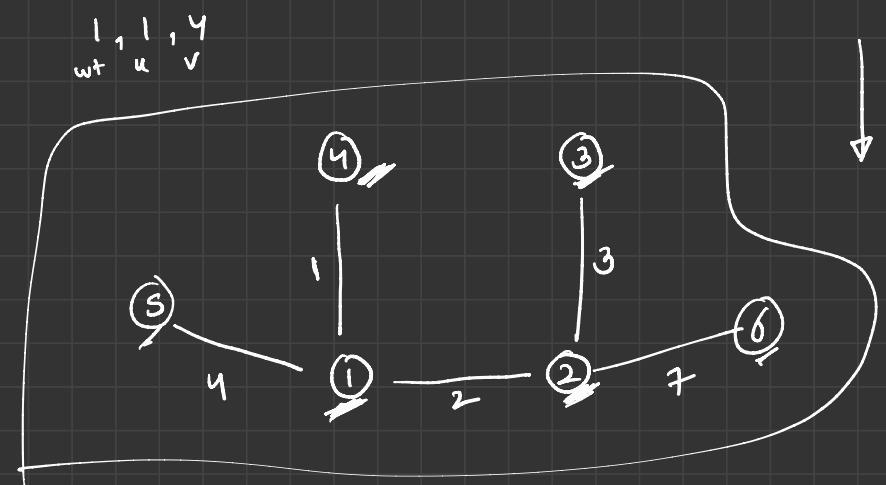
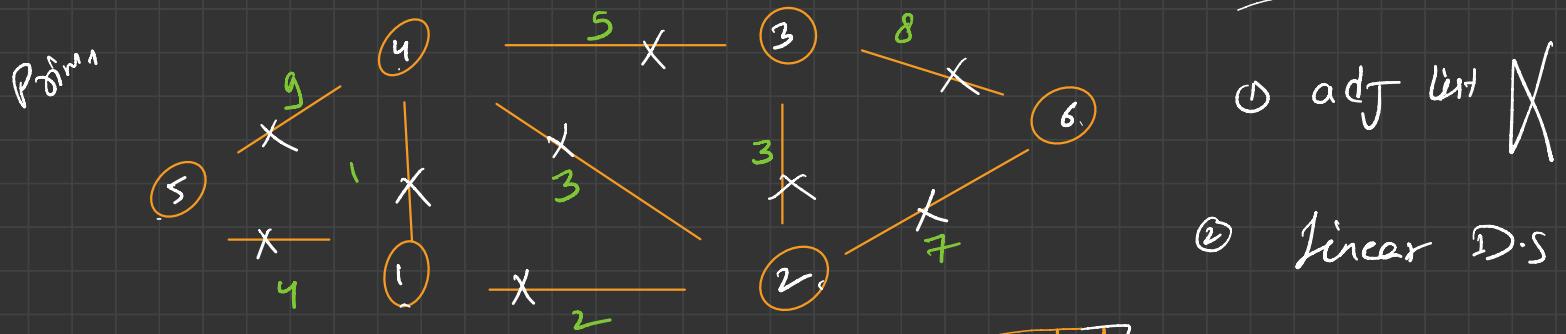
$7 \rightarrow \begin{matrix} 4 \\ 2 \end{matrix}$

Rank

$$\frac{\text{rank}[1] < \text{rank}[4]}{\text{parent}[1] = 4}$$



Kruskal's algo:-

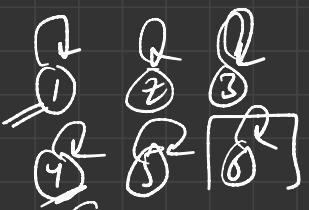


M.S.T

38  $\propto$  45  $\propto$

sorted		
1	1	4
2	1	2
3	2	3
3	2	4
4	1	5
5	3	4
7	2	6
8	3	6
9	4	5
wt	u	v

② Linear D.S



1, 4,

2, 0

$\begin{matrix} & 2 & 3 \\ 1 & & \\ 2 & & \end{matrix}$   
 $\cancel{2, 4}$

$O(n^2) = O(n)$   
 Find and Union  $\Rightarrow O(\underline{\underline{n}})$

$$\overline{T.C} \Rightarrow O(m \log m)$$

$$\overline{S.C-1} \quad O(\underline{\underline{n}})$$

①

$\begin{matrix} u & v \\ 1 & 4 \end{matrix}$

