

Quick Sort

Time Complexity: $n \log n$

4 5 ~~4~~ 3 2 1
4 ↗ 2 ↘ 1

4 5 1 2 3
↑ ↑
L R

2 5 1 4 3
↑ ↑
L R

2 1 5 4 3
↑ ↑ ↗
R L R

2 1 3 4 5

↘

2 1

—

$$\begin{array}{c} \text{=} \\ (1) \quad 2 \Rightarrow \quad \underline{1 \quad 2 \quad 3} \quad \boxed{4 \quad 5} \\ \uparrow \\ L \quad R \end{array}$$

$$\begin{array}{c} \Downarrow \\ (4) \quad 5 \\ (5) \quad 4 \\ \uparrow \uparrow \\ L \quad R \end{array}$$

$$\underline{1 \quad 2 \quad 3 \quad 4 \quad 5} \subseteq 4 \quad 5$$