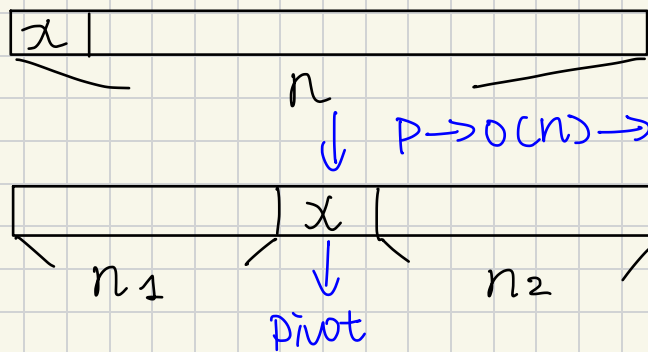


1. worst case: pivot is always the smallest or largest element

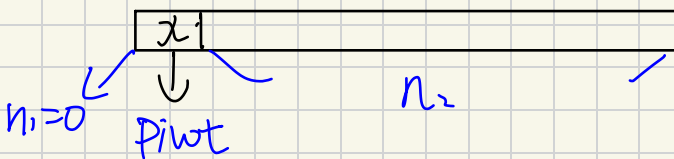


$p \rightarrow O(n) \rightarrow cn$ —————> Performing this partition

$$\rightarrow n_1 + n_2 + 1 = n$$

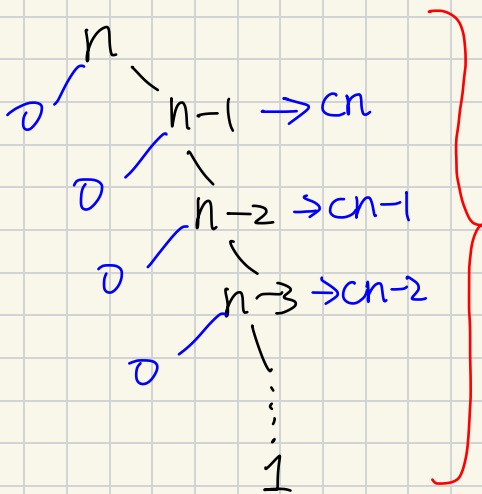
$$T(n) = T(n_1) + T(n_2) + cn$$

Suppose the worst case:



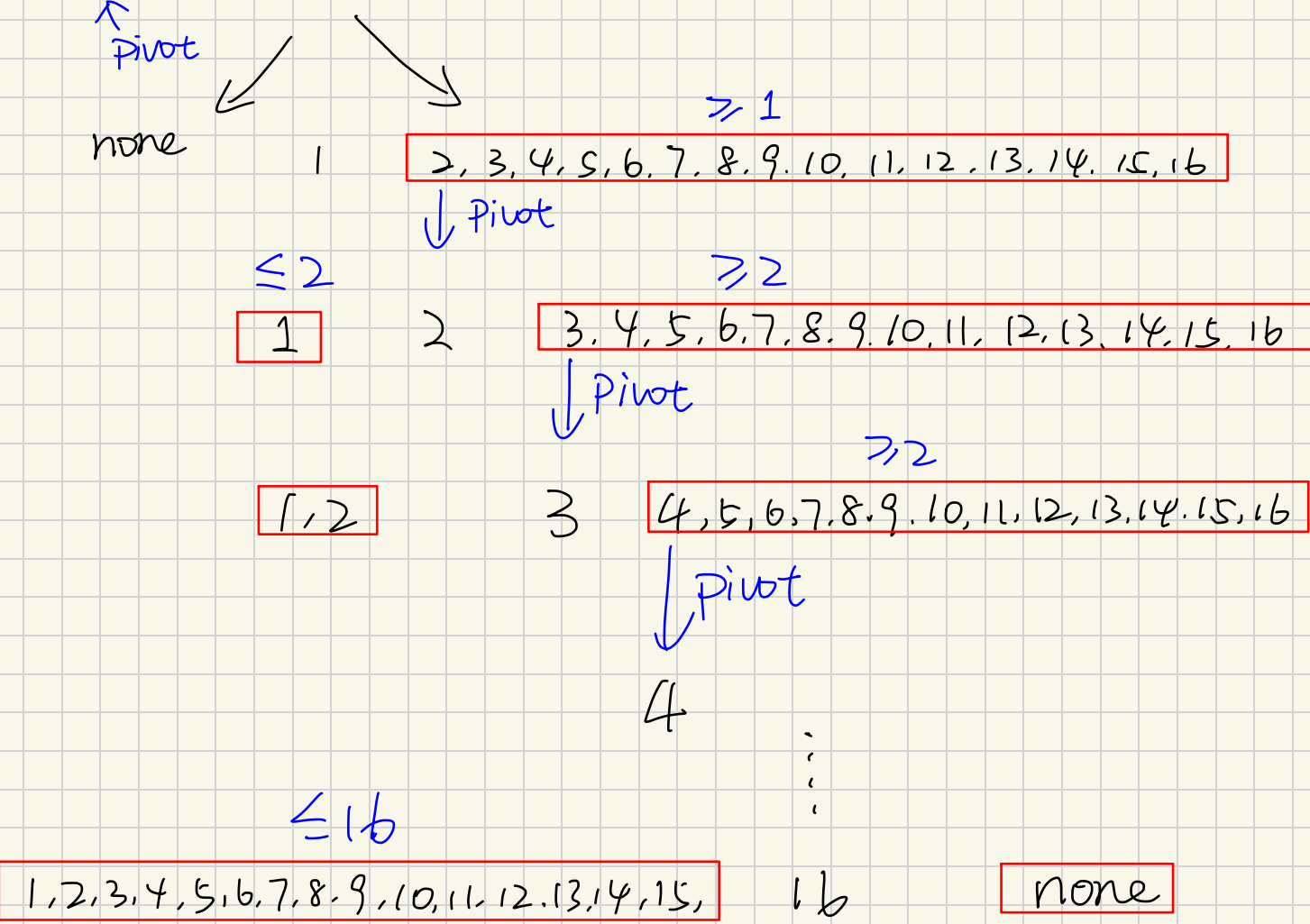
$$n_1 = 0 \quad n_2 = n-1$$

$$T(n) = T(0) + T(n-1) + cn$$



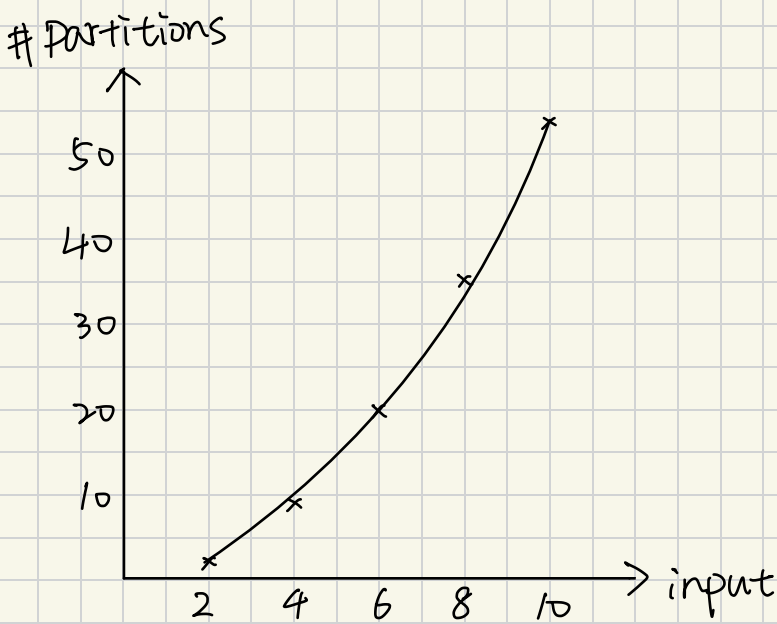
$$\left. \begin{array}{l} c [n + (n-1) + (n-2) + (n-3) + \dots + 1] \\ = c \left(\frac{n(n+1)}{2} \right) \\ = O(n^2) \end{array} \right\}$$

2. [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16]



Sorted: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16

4.



It follows the $O(n^2)$ pattern, which is $\frac{n(n-1)}{2}$