

Sorting & Searching

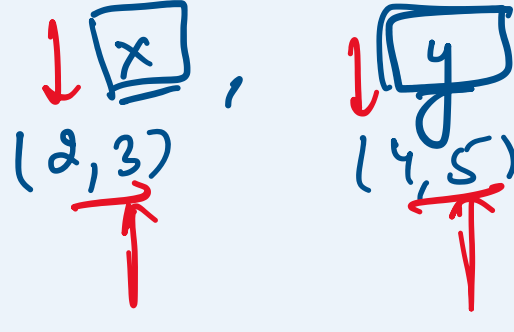
arranging things in order.

- ascending
- descending
- based on properties of elements.

① Array (some integer elements) → ascending
→ descending

② Set of rectangle measurements $[(l_i, b_i), (l_j, b_j), (l_x, b_x)]$

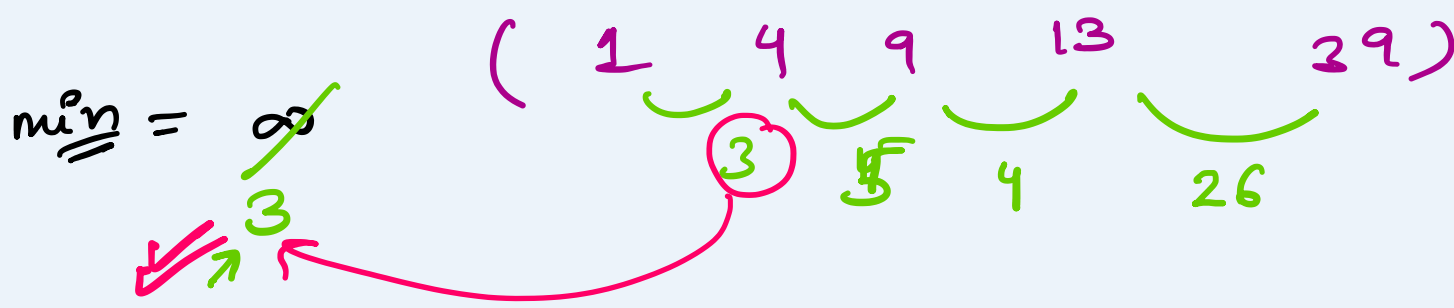
→ comparator



$$\begin{aligned} A[i] &< A[j] \\ \text{area}_i &< \text{area}_j \\ l_i &< l_j \\ b_i &< b_j \\ \text{perimeter}_i &< \text{perimeter}_j \end{aligned}$$

elements → 4 9 1 32 13

↓
sort



Q Given a unsorted array, what would be the worst way to sort the array??

Eg : 2 3 14

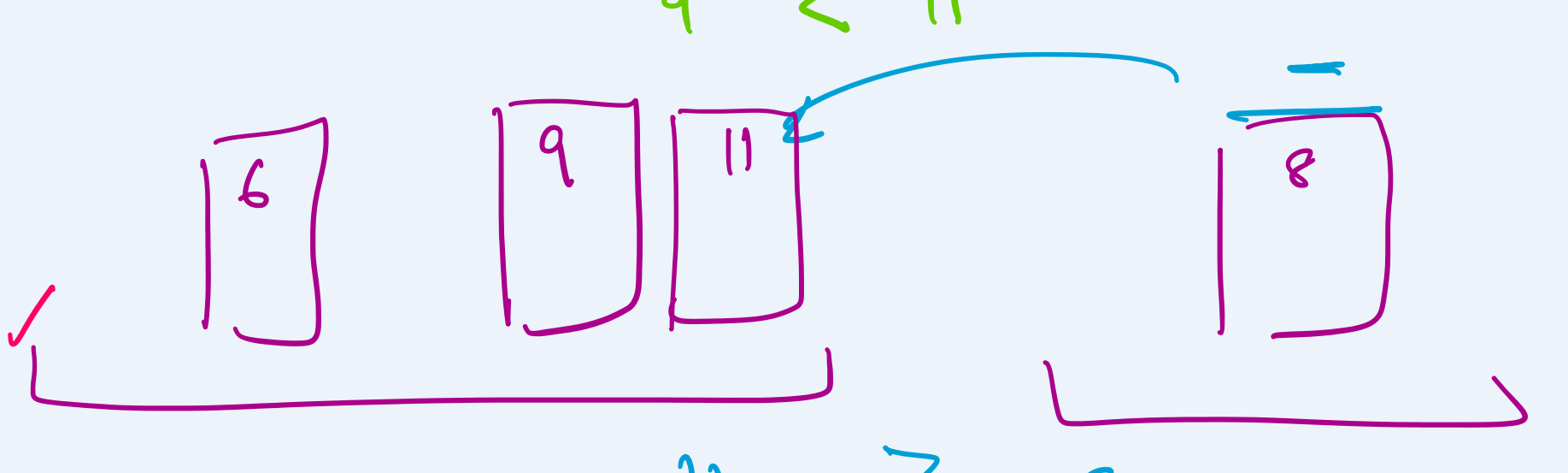
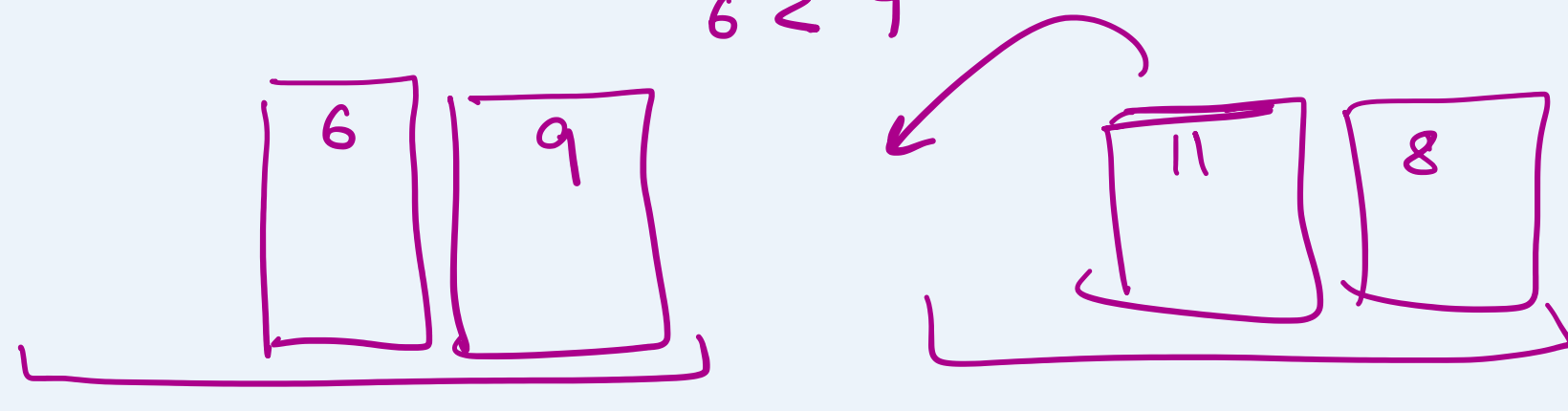
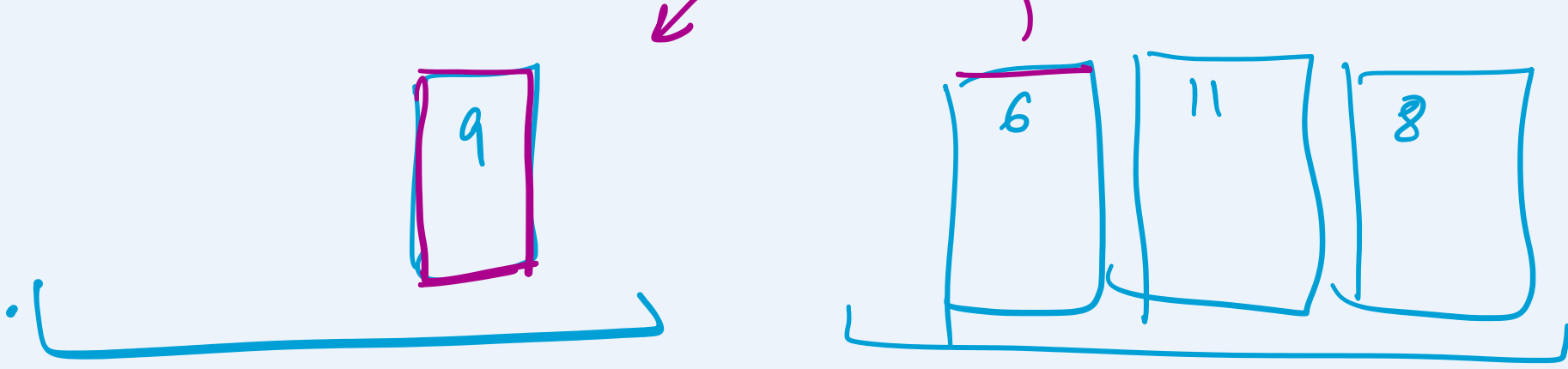
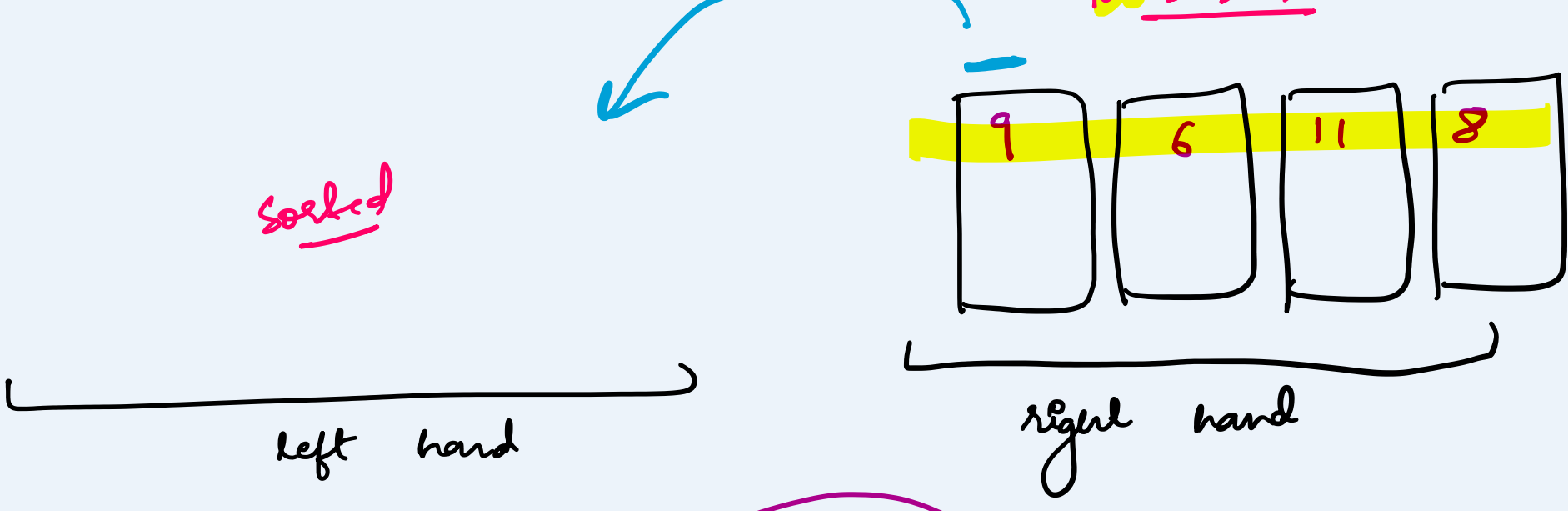
Create all permutations of the array & pick the required one.

2 3 14
2 3 4 1
2 1 4 3
2 4 1 3
2 4 3 1
⋮

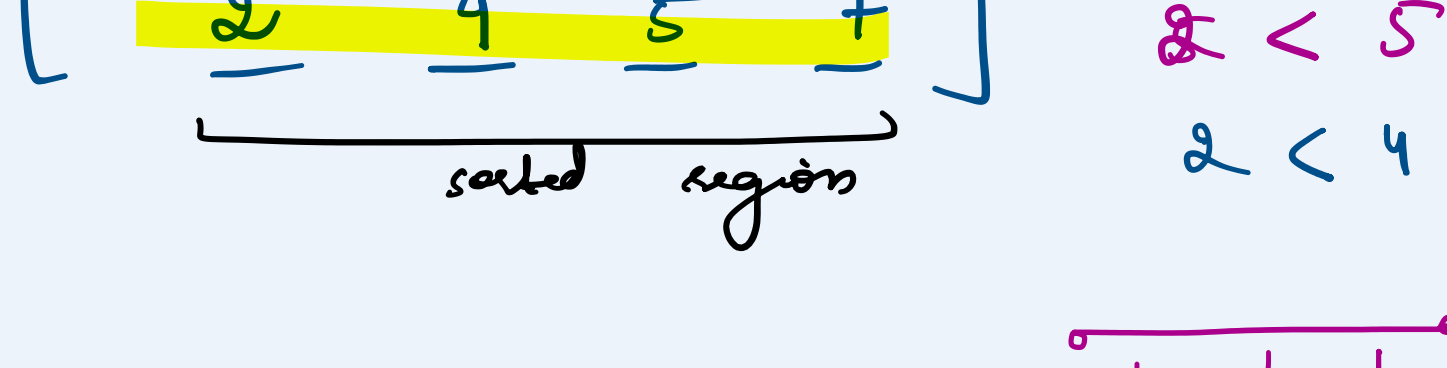
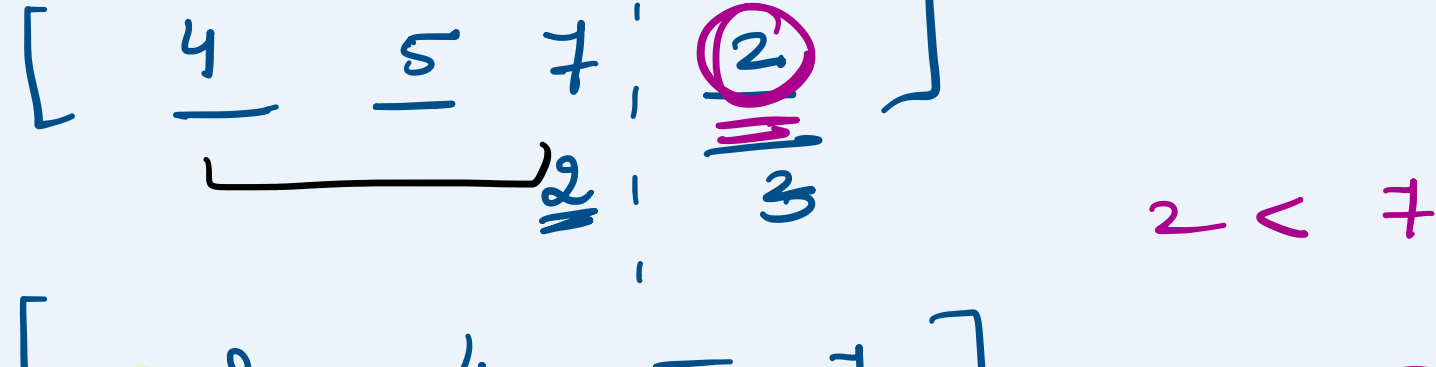
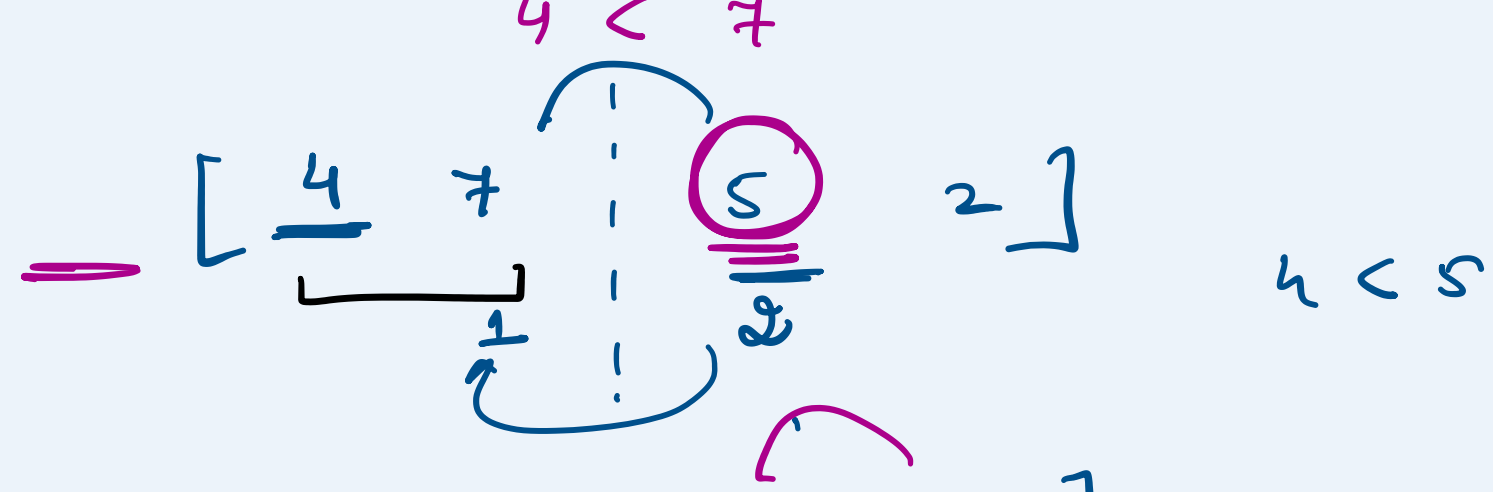
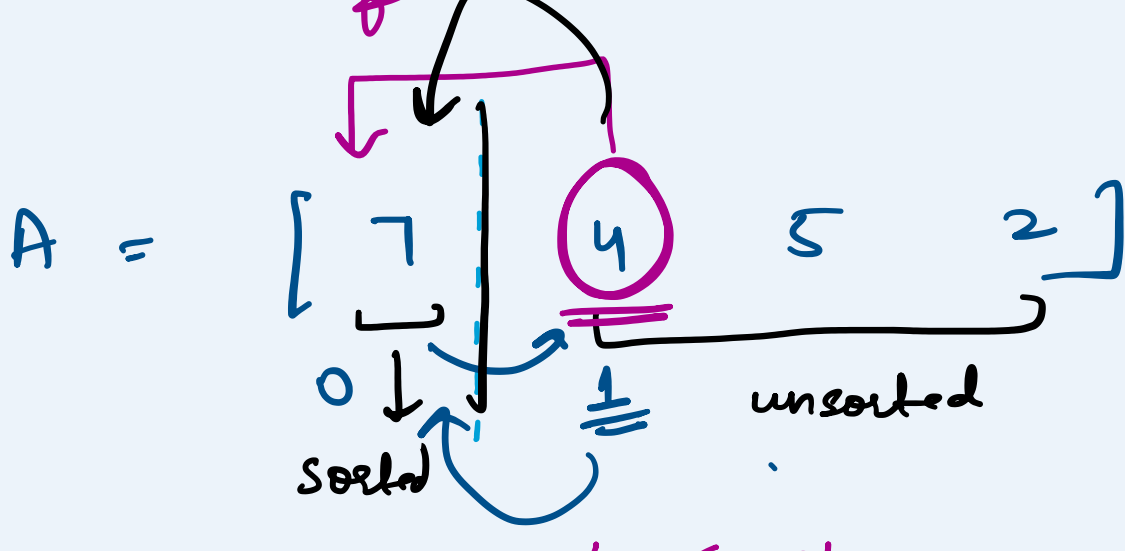
per → $n = 4$ elements
 $n! \times n$

n^2

Q game of cards



11 > 8
9 > 8
6 < 8



Time Complexity:

① Worst case → $O(n^2)$
② Best case → $O(n)$

4 3 2 1

1 2 3 4

Space Complexity

→ $O(1)$

[In-place sorting algo]

Applications

constant extra space.

① almost sorted array

4 7 3 8 9