

Hashing Problems - I



Largest Subarray with zero sum

$a[] = \{1, 1, 5, -3, -4, 3, 4, -1\}$

The diagram shows the array $a[] = \{1, 1, 5, -3, -4, 3, 4, -1\}$. A bracket above the subarray $\{-3, -4, 3, 4\}$ is labeled with a 1 at the start and a 4 at the end, indicating its index range. Below the array, two horizontal arrows indicate the subarray's boundaries: one from index 2 to index 5 labeled 'z' (representing the length), and another from index 4 to index 7 labeled 'y' (representing the length). The indices 2 and 4 are also labeled below their respective arrows.

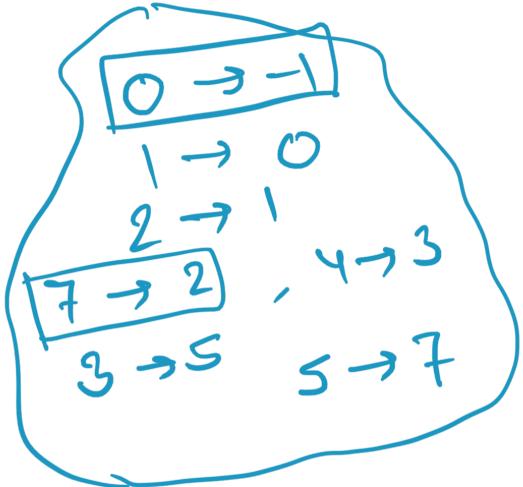
= Cumulative Sum.
+
index

$$x + y = z$$
$$\boxed{x = z}$$

$$a[] = \{ -1, 0, 1, 1, 5, 3, -3, -4, 3, 1, 4, -1 \}$$

CS

Ans = ϕ S

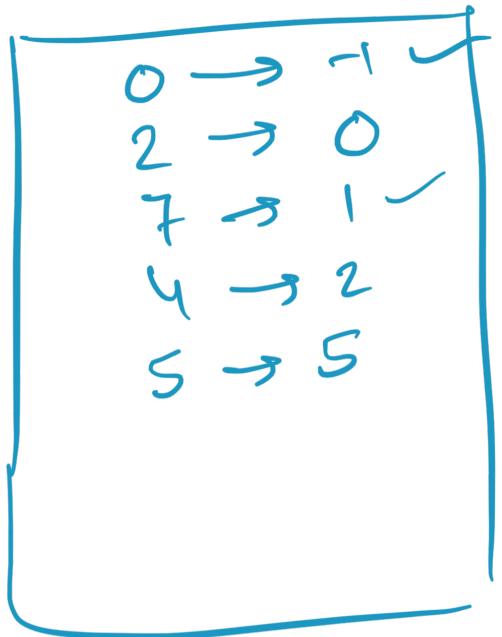


$$4 - (-1) \\ = S$$

$$6 - 2 = 4$$

$\{2, 5, -3, -4, 2, 3, 2\}$

ans = 9 ~~4~~(5)



$$cs = 7$$

$$prev = 1$$

$$ans_2 \text{ mark}(0, 3 - (-1))$$

$$\text{mark}(0, 4)$$

$$= 4$$

$$4 - 0 = 4$$

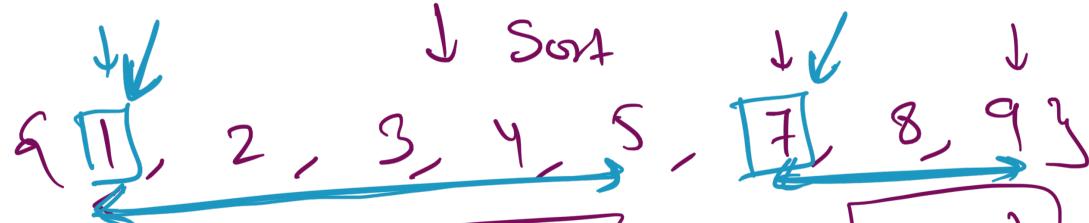
$$6 - 1 = \underline{5}$$

Longest Consecutive Subsequence

$$a[] = \{2, 1, 9, 3, 5, 4, 8, 7\}$$

$$ans = 5$$

$O(n \log n + n)$
 \downarrow
 $O(n \log n)$



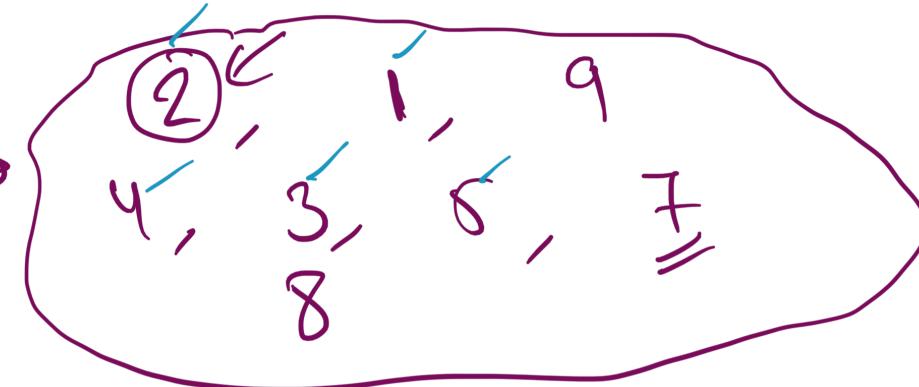
In log n

$O(n)$

using space.

$\rightarrow a[] = \{ 2, 1, 9, 3, 5, 4, 8, 7, 2, 1, 3 \}$

Set =



ans = S

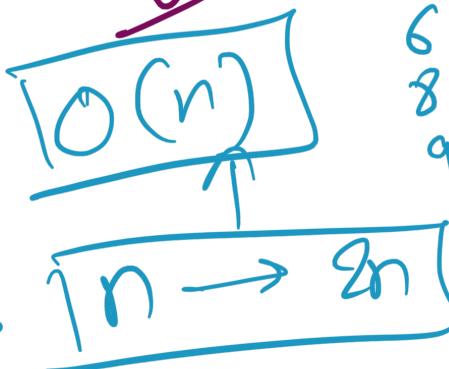
$$2 - 1 = 1$$

$$\text{len} = 1 + 1 + 1 + 1 + 1 = 5$$

$$\text{len} = 1 + 1 + 1 = \underline{\underline{3}}$$

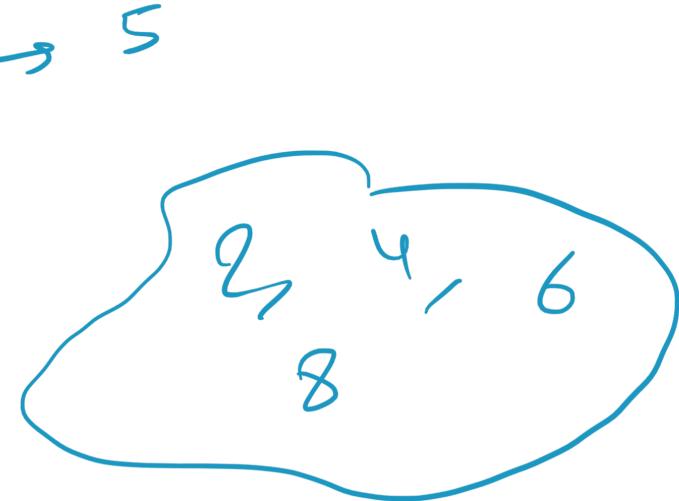
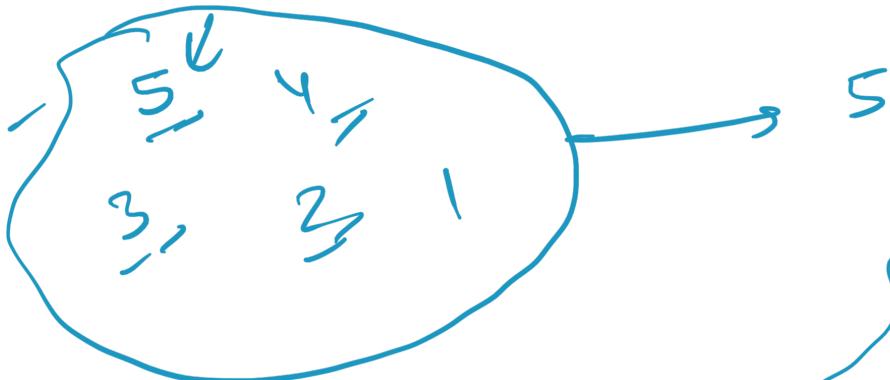
2 → 1
1 → 5
9 → 1
4 → 1
3 → 1

5 → 1
7 → 3
8 → 1

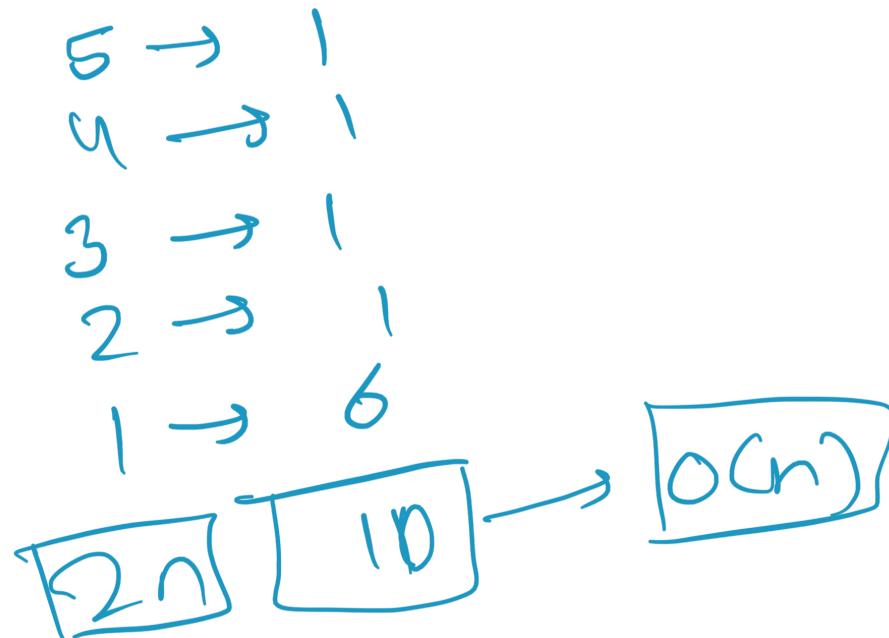


6 8 9

Set 2

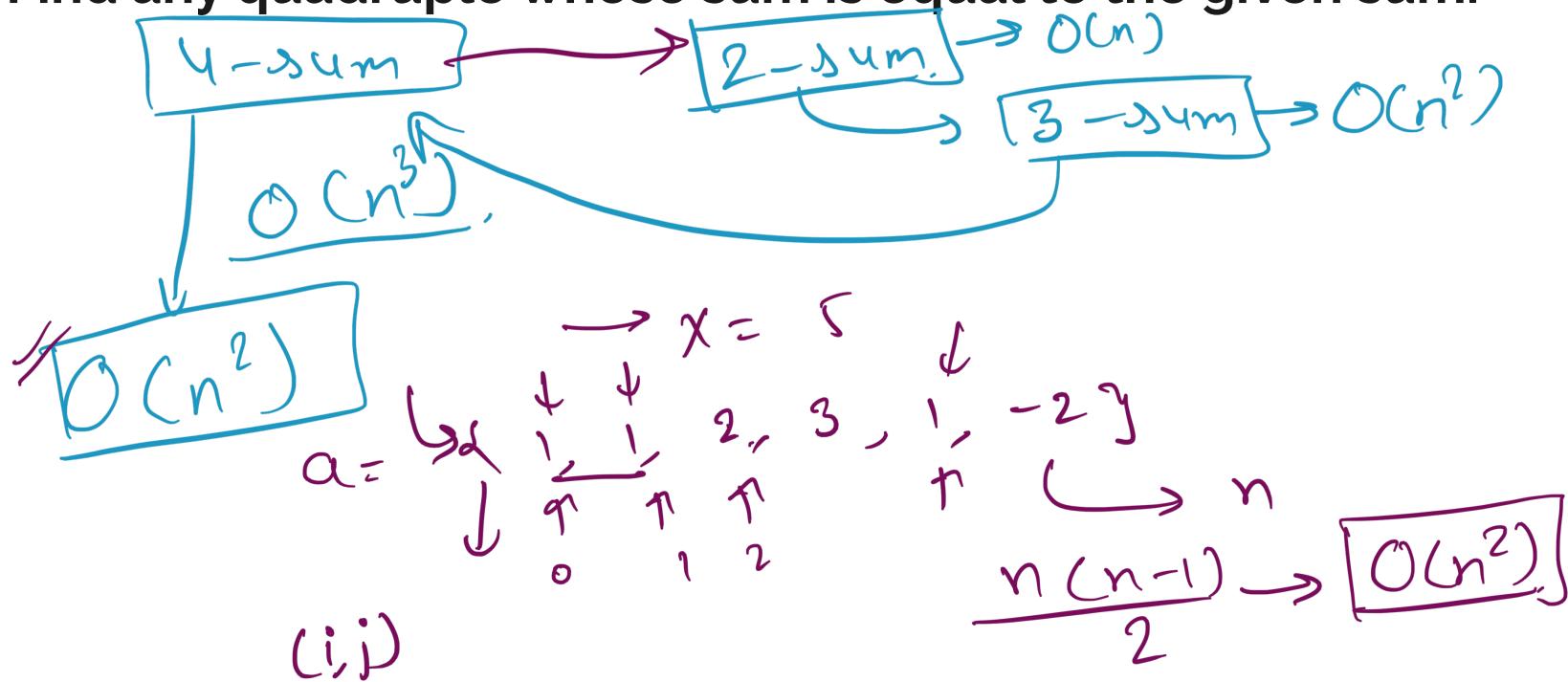


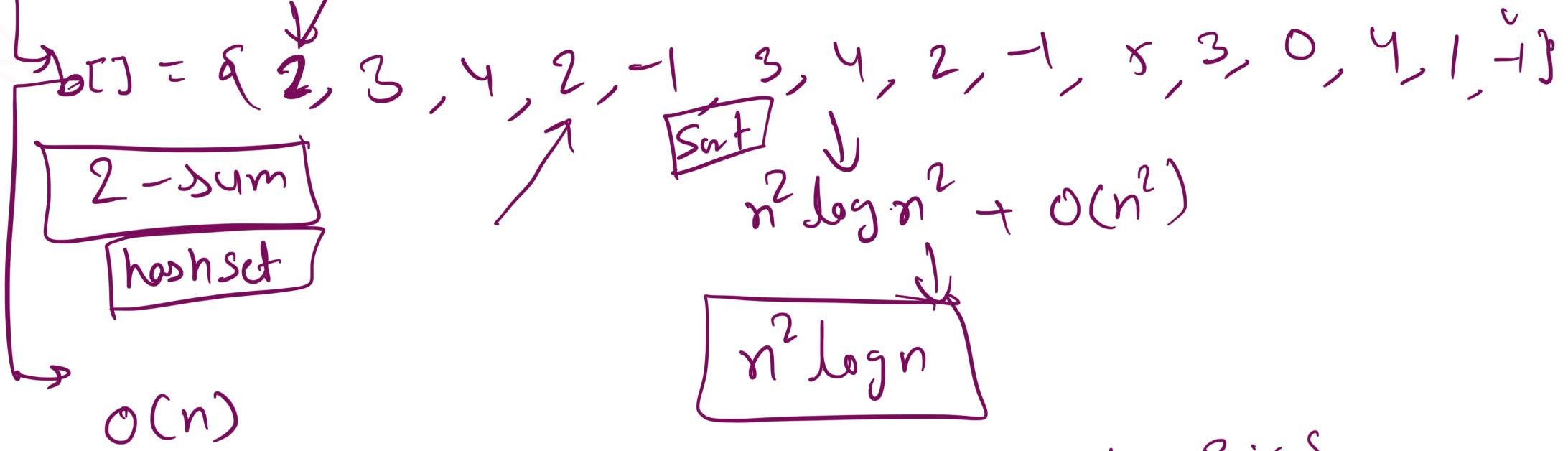
0
1
2
3
4
5
→ 6



2 → 2
4 → 2
6 → 2
8 → 2
 $\underline{2n \rightarrow 8}$

Find any quadruple whose sum is equal to the given sum.





n size unsorted array
 2 Sum
 $O(n^2)$, TC $\rightarrow O(n^2)$

class Pair {
 int i, j
 }
 $2 \rightarrow (0, 0)$
 $3 \rightarrow (0, 2)$

$a[] = \{ 1, 2, 1, 0, 1 \}$

$x = 5$

$\rightarrow 3 \rightarrow (0, 1)$

$\rightarrow 2 \rightarrow (0, 2)$

$1 \rightarrow (0, 3) \times$

$2 \rightarrow (0, 4) \times$

$3 \rightarrow (1, 2) \times$

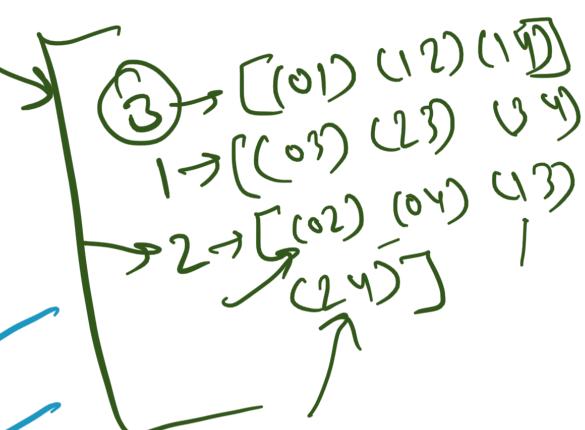
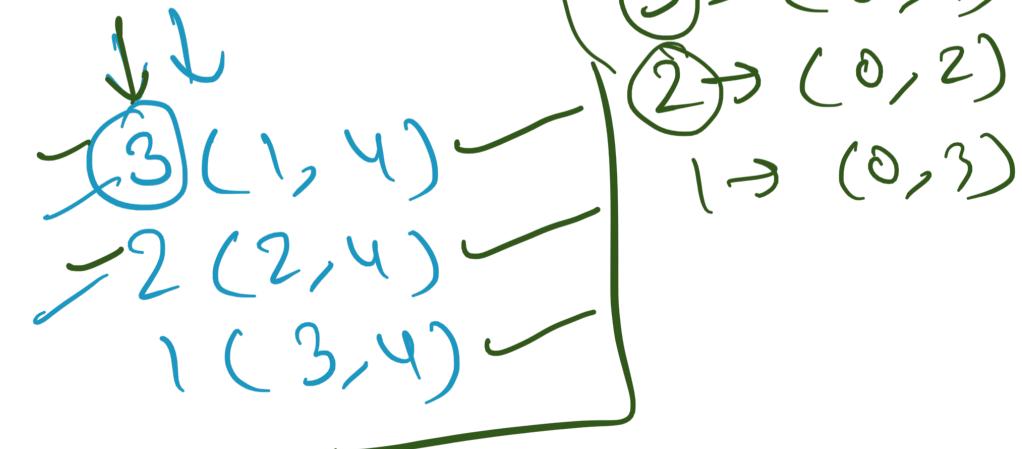
$2 \rightarrow (1, 3) \times$

$3 \rightarrow (1, 4) \checkmark$

$1 \rightarrow (2, 3) \times$

$2 \rightarrow (2, 4) \checkmark$

$1 \rightarrow (3, 4)$



12 → $\{ \frac{1}{2}, \frac{1}{1}, \frac{3}{2}, \frac{5}{3}, \frac{6}{4} \}$



$\rightarrow 3 \rightarrow (0, 1)$

$\textcircled{5} \rightarrow (0, 2)$

$X_7 \rightarrow (0, 3)$

$X_8 \rightarrow (0, 4)$

$4 \rightarrow (1, 2)$

$6 \rightarrow (1, 3)$

$\textcircled{7} \rightarrow (1, 4)$

$8 \rightarrow (2, 3)$

$\rightarrow 9 \rightarrow (2, 4)$

$11 \rightarrow (3, 4)$

$num[] = [1, 0, -1, 0, -2, 2]$

0

$\rightarrow [0, 1] \rightarrow [0, 3] \rightarrow [2, 5]$

$\rightarrow 0 \rightarrow [0, 2] \rightarrow [1, 3] \rightarrow [4, 5]$

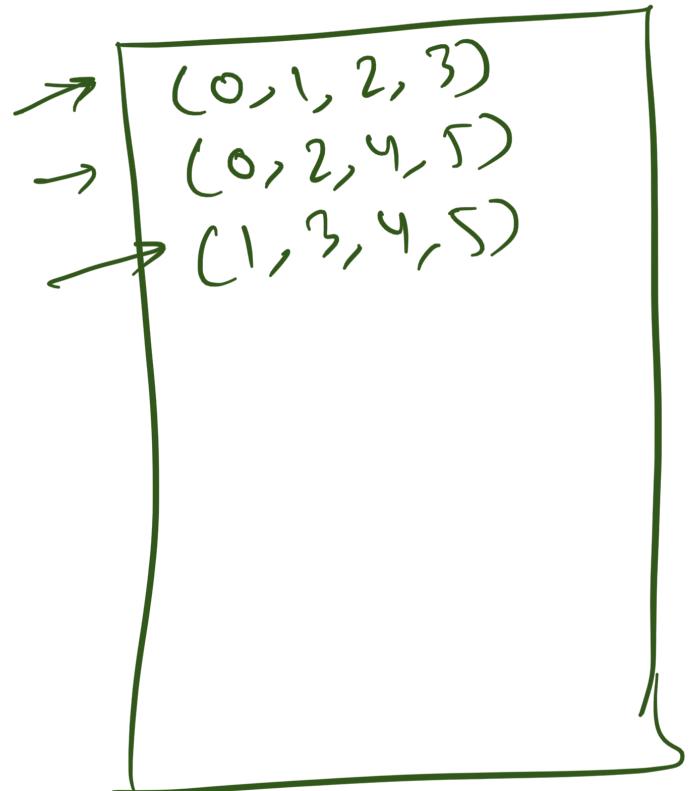
$\rightarrow -1 \rightarrow [0, 4] \rightarrow [1, 2] \rightarrow [2, 3]$

$3 \rightarrow [0, 5]$

$-2 \rightarrow [1, 4] \rightarrow [3, 4]$

$2 \rightarrow [1, 5] \rightarrow [3, 5]$

$-3 \rightarrow [2, 4]$



Hashmap<Array>

Practice Problems

1. Longest Substring without repeat.
2. <https://www.interviewbit.com/problems/anagrams/>
3. <https://www.interviewbit.com/problems/colorful-number/>
4. <https://www.interviewbit.com/courses/programming/hashing>