Two-sum

Saturday, August 7, 2021 9:47 PM

-1	6	2	-4	3	7	9	11	5
0	1	2	3	4	5	6	7	8

target = 11

(2, 9) ←

$x + y = 11$

1.) Brute force: Run a for loop from i=0 and go to each elements one by one

i.e, $x = arr[i]$, $y = arr[j]$ {where $j = i+1$}

⇒ two for loops of n →

⇒ $O(n^2)$ TC, $O(1)$ SC

$arr[i] + arr[j] = 11$

2.) Unordered map/set: We can store the elements of the array in a map and corresponding to each element, we store its indices.

e.g.

-1	0
6	1
2	2
⋮	⋮

We will run a for loop from i=0 which will represent x

Now, $y = 11 - x$.

So, we will find if y is present in the map or not.

Return the indices

⇒ $O(n + n) = O(n) + O(1) = O(n)$ TC, $O(n)$ SC

(traversing)

↑ to insert elements in the map

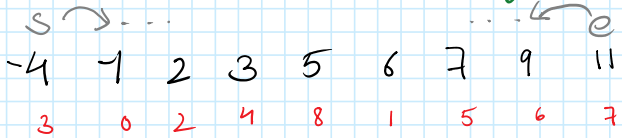
↑ searching in map

3.) Sorting : a) We will pair the elements with their indices before sorting them.

pair<int, int> (-1, 0), (6, 1), ...

b) Form a vector of this pair

c) Sort the vector according to the first value



d) Two pointers, s = 0, e = n-1

e) We add s & e and check with 11

if < 11, then s++

if > 11, then e--

f) when s+e = 11, return indices.

⇒ O(nlogn) O(n)

TC SC

For unsorted array, best approach is (2) and for sorted array (3)