

## Design Two Sum in infinite Stream

Adding data Streams , allows duplicates  
Contains +ve & -ve numbers

**Constraints**  
Average Case of Time Complexity :  
add(int) => O(1)  
find(int) => O(n)

Stream

public void add(int value)

adds data to the Stream

public boolean find(int val)

returns true if two sum exists in stream  
with the given value.

Example :  
add(3);  
add(1);  
add(2);

3,2,1

find(3) => true (onStream 1+2)  
find(2) => false (no sum of two elements on Stream)

Example :  
add(0);  
add(1);  
add(0);

3,2,1,0,1,0

find(0) => true (onStream 0+0)  
find(2) => true (on Stream 1+1)

Example :  
add(-1);  
add(6);

3,2,1,0,1,0,-1,6

find(5) => true  
onStream 6-1 = 5  
find(8) => true 6+2  
find(10) => false  
(6+3+1 = 10 but its not  
Two element sum)

## Brute Force Solution

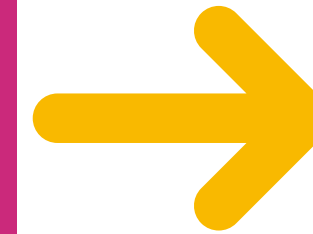
Stream Storage : ArrayList  
Input : (3,2,1)  
find(val)  
find(3):  
Find Diff in each index (n)  
Check diff present in array or not (n)



Time Complexity :  $O(n^2)$

## Sorting Solution

Stream Storage : ArrayList  
Input : (3,2,1)  
Sorting : find(val)



Time Complexity :  $n\log(n) + O(n/2) = n\log(n)$

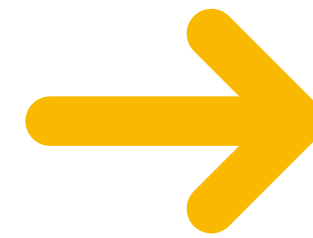
Sort ( 1,2,3)

Lets do Search Pattern:  
low = index0 = 0  
high = n-1 = 2

Find twoSum with arr[low] + arr[high]  
twoSum > val  
high = high-1  
twoSum < val  
low = low+1  
twoSum == val  
return true.

## Hashing Solution

Stream Storage : Map  
Input : (3,2,1,3)  
find(val)



Time Complexity :  $O(n) + O(1)/O(\log n) = O(n)$

Map:<key , value>

3 -> 2  
2 -> 1  
1 -> 1

Map < key (element), value (repeatedCount) >

Iterate the map and find the diff at each iteration.

If the diff is not equals to currentKey then  
check does the diff exists in map or not.

If the diff is equals to currentKey then check  
Does the currentKey repeatedCount is > 1 or not.

find(6)

Iterate the map and find the diff at each iteration.

If the diff is not equals to currentKey then  
check does the diff exists in map or not.

If the diff is equals to currentKey then check  
Does the currentKey repeatedCount is > 1 or not.