Two Sum Using Hashmap

n = 4
t = 9
arr = [2, 7, 11, 15]

```
Scanner sc = new Scanner(System.in);
 int n = sc.nextInt();
 int t = sc.nextInt();
 int arr[] = new int[n];
 for(int i=0; i<n; i++){
    arr[i] = sc.nextInt();
 }
```

$$\begin{array}{cccc} 0 & 1 & 2 & 3 \\ \underline{\underline{2}}, & \underline{\underline{7}}, & 11, & 15 \end{array}$$], target = $\underline{\underline{9}}$

diff = 9 − 2 = 7
    hm.put(7, 0);

```
for(int i=0; i<arr.length; i++)
      valuereq = target - arr[i];
                 // 9 - 2 = 7
```

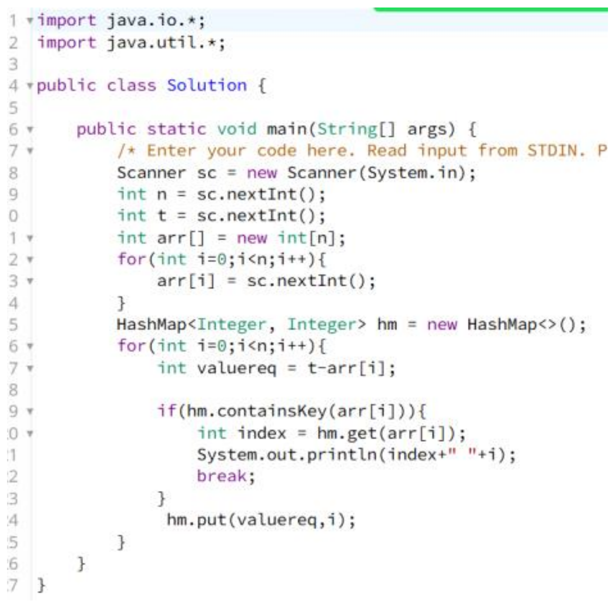
7, 0 —

```
                // 9 - 2
T.O  ←  hm.put(valueeq, i);
        if (hm.containsKey(arr[i]))
       int index = hm.get(arr[i]);
       S.o.pln(i + " " + index);
         break;
        }
}
```

```
 0    1    2    3    4        0 → 7
 2,   6,   11,  15,  -2       1 → 2
 ↓    ↓    ↓    ↓             2 → -2
 7    2    -2   -6            3 → -6
```

2, 4

11 + (-2) = 9.



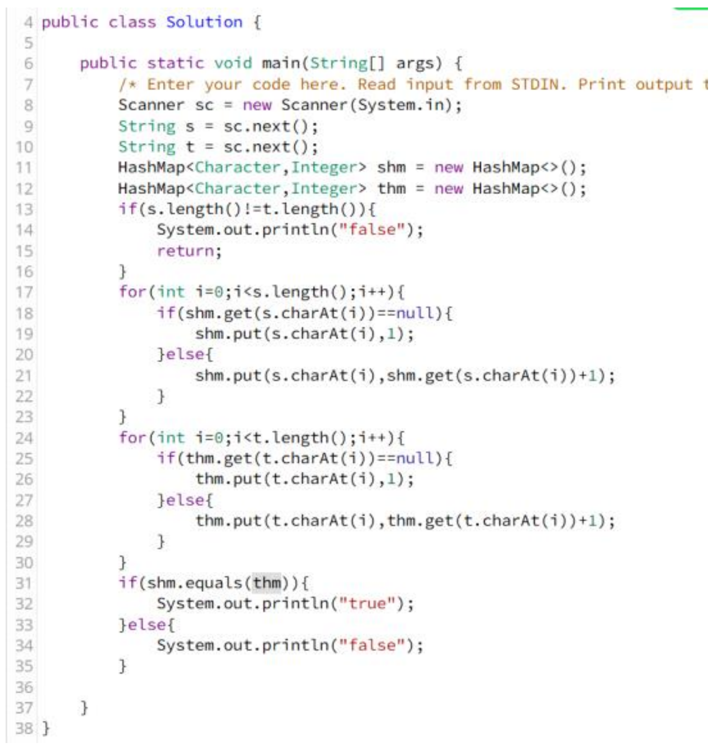
```java
import java.io.*;
import java.util.*;

public class Solution {

    public static void main(String[] args) {
        /* Enter your code here. Read input from STDIN. P
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        int t = sc.nextInt();
        int arr[] = new int[n];
        for(int i=0;i<n;i++){
            arr[i] = sc.nextInt();
        }
        HashMap<Integer, Integer> hm = new HashMap<>();
        for(int i=0;i<n;i++){
            int valuereq = t-arr[i];

            if(hm.containsKey(arr[i])){
                int index = hm.get(arr[i]);
                System.out.println(index+" "+i);
                break;
            }
             hm.put(valuereq,i);
        }
    }
}
```

Valid Anagram

s = "anagram"
t = "nagaram"

s → hm1 →	a → 3	t → hm2 → n → 1
	n → 1	a → 3
	g → 1	g → 1
	r → 1	r → 1
	m → 1	m → 1

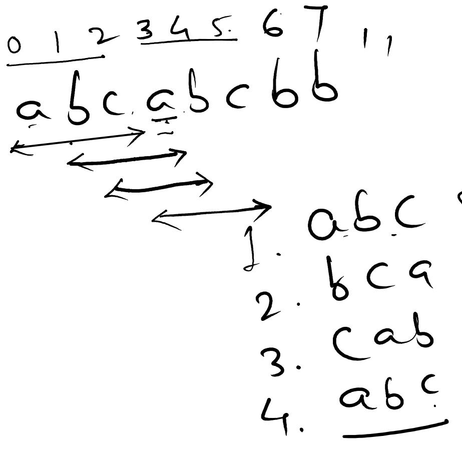
1. It should be of same length
2. Create hashmap for first string and store its frequency.
3. Create hashmap for second string and store its frequency.
4. Compare if both hashmap are same return true, otherwise return false.



```java
public class Solution {

    public static void main(String[] args) {
        /* Enter your code here. Read input from STDIN. Print output t
        Scanner sc = new Scanner(System.in);
        String s = sc.next();
        String t = sc.next();
        HashMap<Character,Integer> shm = new HashMap<>();
        HashMap<Character,Integer> thm = new HashMap<>();
        if(s.length()!=t.length()){
            System.out.println("false");
            return;
        }
        for(int i=0;i<s.length();i++){
            if(shm.get(s.charAt(i))==null){
                shm.put(s.charAt(i),1);
            }else{
                shm.put(s.charAt(i),shm.get(s.charAt(i))+1);
            }
        }
        for(int i=0;i<t.length();i++){
            if(thm.get(t.charAt(i))==null){
                thm.put(t.charAt(i),1);
            }else{
                thm.put(t.charAt(i),thm.get(t.charAt(i))+1);
            }
        }
        if(shm.equals(thm)){
            System.out.println("true");
        }else{
            System.out.println("false");
        }

    }
}
```

Longest Substring without Repeating character

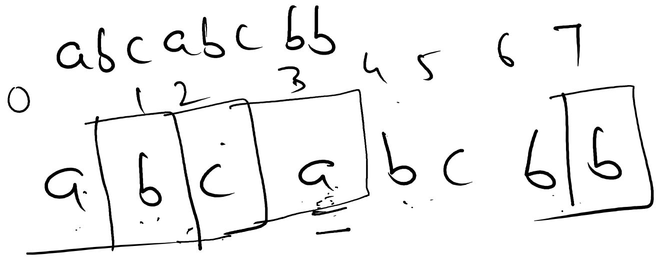
String s = "abcabcbb"



abdma
0 →
0 1 2 3 4

0 1 2 3 4 5 6 7
"abcabcbb"

We will solve this by using sliding window



max length = 3

start = 0

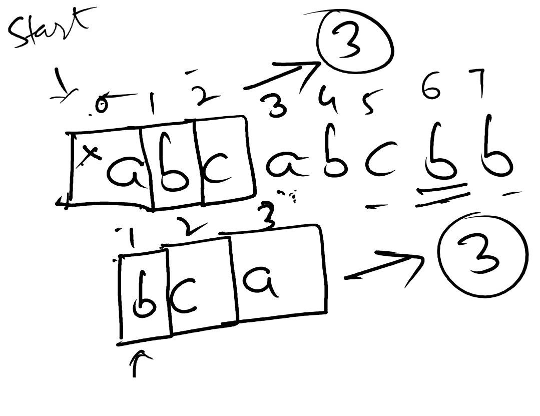
abcb ×
bcb ×
cb ✓

① a → 3
b → 1
c → 2

Hashmap

bca

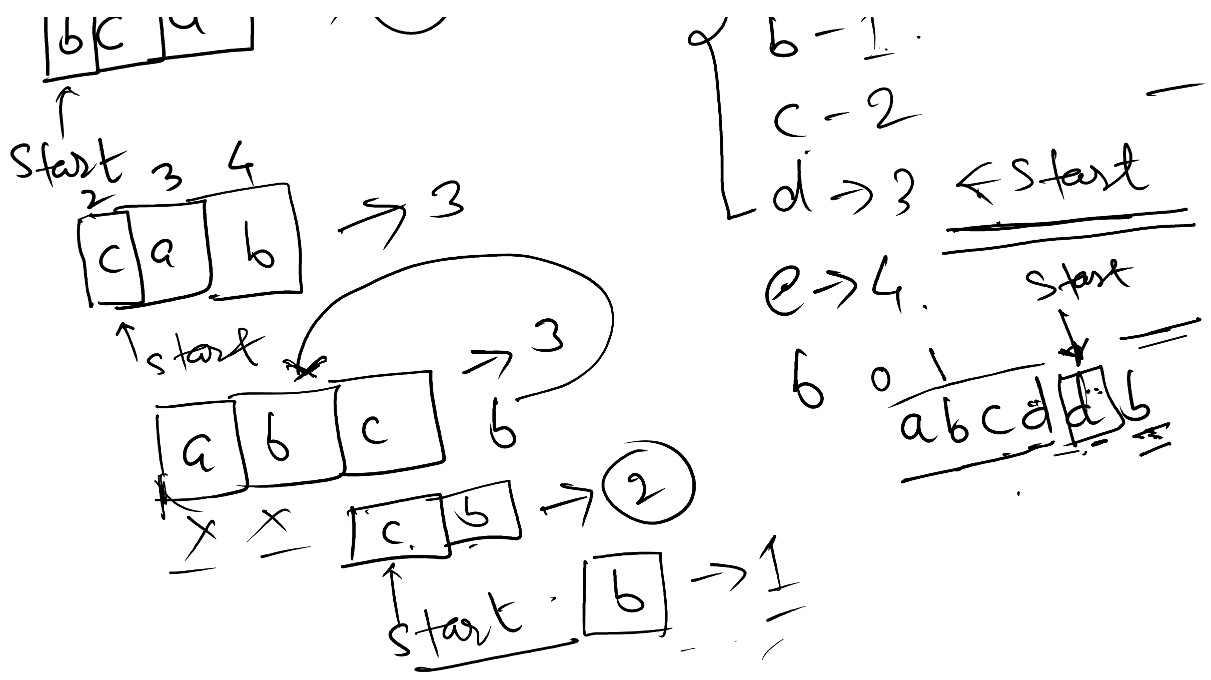
```
if (hm.containsKey(s.charAt(i)) {
    start = hm.get(s.charAt(i)) + 1;
```



abca.

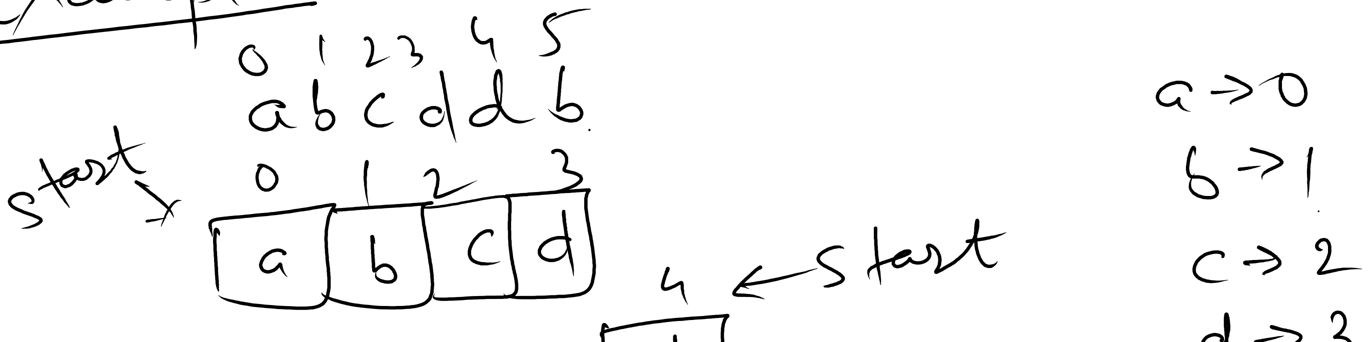
start → 0

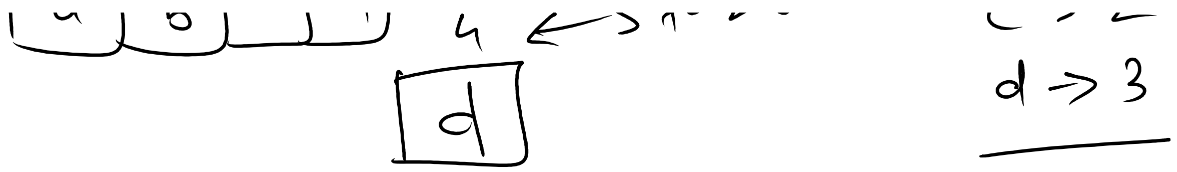
a - 3
b - 1



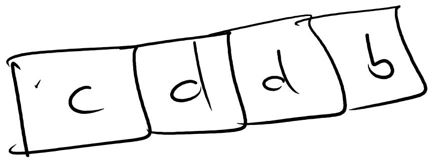
There will be a scenario when start will be at higher index but if any char in right comes which has already existed in left then it will be present in hashmap, then start will shift to next of that char which will voilate condition of non-repeating characters, therefore, we should only update start when the index of repeated char in hashmap is greater than start.

Example:-





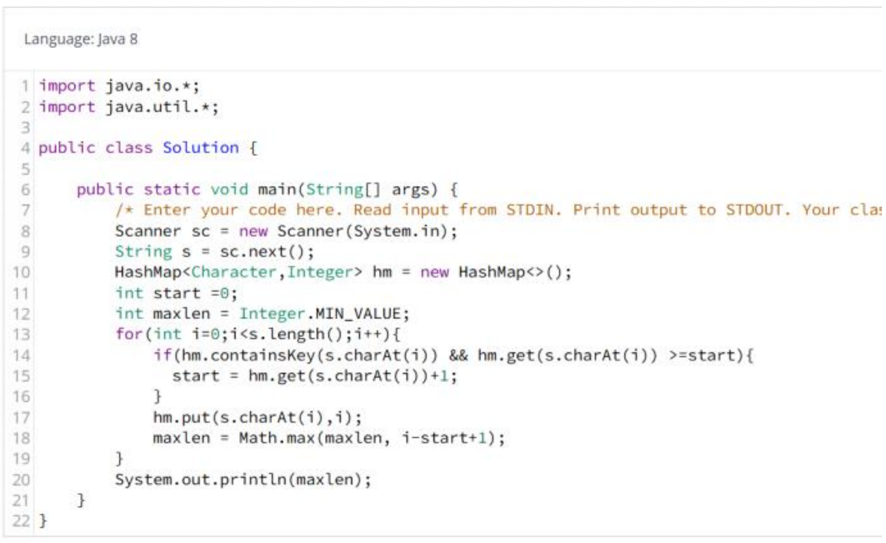
if we don't write that condition then start will point to hm.get(b)+1 which is 2.



↳ It's not valid

therefore, we should have this condition to update start → hm.get(b) >= start

s.charAt(i)



Language: Java 8

```java
import java.io.*;
import java.util.*;

public class Solution {

    public static void main(String[] args) {
        /* Enter your code here. Read input from STDIN. Print output to STDOUT. Your cla
        Scanner sc = new Scanner(System.in);
        String s = sc.next();
        HashMap<Character,Integer> hm = new HashMap<>();
        int start =0;
        int maxlen = Integer.MIN_VALUE;
        for(int i=0;i<s.length();i++){
            if(hm.containsKey(s.charAt(i)) && hm.get(s.charAt(i)) >=start){
              start = hm.get(s.charAt(i))+1;
            }
            hm.put(s.charAt(i),i);
            maxlen = Math.max(maxlen, i-start+1);
        }
        System.out.println(maxlen);
    }
}
```