



# ÇANKAYA UNIVERSITY

## SENG 201 Data and Game Structures

### Lab Assignment 10

In this exercise you will implement some algorithms using hashing.

**HashMap** in Java stores the data in (Key, Value) pairs, and you can access the Value using the Key. If you try to insert the duplicate key in HashMap, it will replace the element of the corresponding key. First you have to import the HashMap library, then you can create HashMap objects specifying the key and value types as shown in the example below:

```
import java.util.HashMap;
...
HashMap<String, Character> map = new HashMap<String, Character>();
map.put( "test", 'a' );
...
char ch = map.get( "test" );
```

You can check additional methods of the HashMap library from the oracle documentation webpage if you need.

#### PROBLEMS

1. Implement a method “checkAnagrams( str1, str2 )” that takes two strings as input and returns **True** if they are anagrams, and **False** otherwise. Anagrams are words or phrases formed by rearranging the letters of another. Your implementation should work in linear time complexity.

```
public static boolean checkAnagrams ( String str1, String str2 ) {
    ...
}
```

Some example anagrams:

- CAT and ACT
- BORED and ROBED
- PLAYERS and PARSLEY
- AABBCC and CBABAC



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2. Implement a method "findSum" that, given an array "arr" of n numbers and another number x, finds and prints all possible two elements in "arr" whose sum is exactly x. Your implementation should work in linear time complexity.

```
public static void findSum ( int[] arr, int x ) {  
    ...  
}
```

As an example: given array [ 5,3,2,8,4,3,6 ] and x=6, elements than give the sum are:

- 3 and 3
- 2 and 4

3. Implement a method "isSubsetOf" where given two integer arrays "arr1" and "arr2", determines whether "arr2" is a subset of "arr1" or not. Your implementation should work in linear time complexity.

```
public static boolean isSubsetOf ( int[] arr1, int[] arr2 ) {  
    ...  
}
```

As an example, let A=[1, 2, 3, 4, 5], B1=[ 4, 1, 2 ] and B2=[ 2, 2 ]

Here B1 is a subset of A, however B2 is not a subset of A.

You should submit one zip file name as "YourNameSurname\_Lab10.zip" and it should contain the java file you created.