Assignment (Collection Framework)

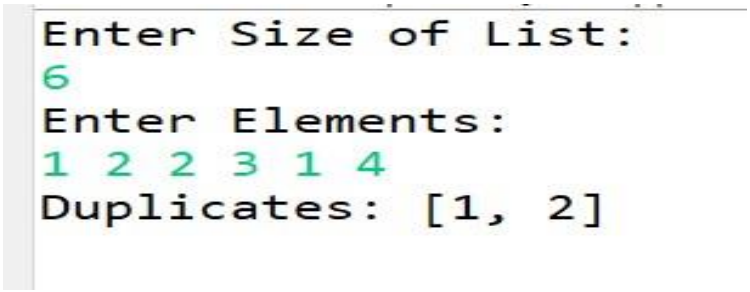
1)Write a Java program that takes a list of integers as input and returns a list of duplicate integers.

Code:

```
package org.Q1;

import java.util.ArrayList;

import java.util.HashMap;

import java.util.List;

import java.util.Scanner;


public class FindDuplicates {

    public static List<Integer> findDuplicates(List<Integer> numbers) {

        HashMap<Integer, Integer> count = new HashMap<>();

        List<Integer> duplicates = new ArrayList<>();

        for (int num : numbers) {

            count.put(num, count.getOrDefault(num, 0) + 1);

        }

        for (int key : count.keySet()) {

            if (count.get(key) > 1) {

                duplicates.add(key);

            }

        }


        return duplicates;

    }
```

```
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter Size of List:");
        int n = sc.nextInt();
        List<Integer> numbers = new ArrayList<>();
        System.out.println("Enter Elements:");
        for (int i = 0; i < n; i++) {
            numbers.add(sc.nextInt());
        }
        List<Integer> duplicates = findDuplicates(numbers);
        if (duplicates.isEmpty()) {
            System.out.println("No duplicates found.");
        } else {
            System.out.println("Duplicates: " + duplicates);
        }
        sc.close();    }
}
```

OUTPUT:



2)Create a Person class with attributes name and age. Write a Java program that sorts a list of Person objects first by age and then by name if the ages are equal.

CODE:

```
package org.Q1;


import java.util.Arrays;

import java.util.Collections;

import java.util.Comparator;

import java.util.List;


class Person {

   String name;

   int age;


   Person(String name, int age) {

      this.name = name;

      this.age = age;

   }


   public String getName() {

      return name;

   }


   public int getAge() {

      return age;

   }
```

```
    @Override
    public String toString() {
        return name + " (" + age + ")";
    }
}

public class Program {
    public static void main(String[] args) {
        List<Person> persons = Arrays.asList(
            new Person("John", 25),
            new Person("Alice", 22),
            new Person("Bob", 25),
            new Person("David", 30)
        );

        Collections.sort(persons,
Comparator.comparing(Person::getAge).thenComparing(Person::getName));

        System.out.println("Sorted Persons:");
        for (Person person : persons) {
            System.out.println(person);
        }
    }
}
```

OUTPUT:

```
Sorted Persons:
Kadambinee (22)
```

Ketaki (23)

Pragati (25)

Vanshu (30)

3)Write a Java program to find the first non-repeated character in a string using a HashMap.

String input = "aabbccddeffg";

Expected output = 'e';

CODE:

```
package org.Q1;

import java.util.LinkedHashMap;
import java.util.Map;

public class FirstNonRepeatedCharacter {
    public static char findFirstNonRepeatedChar(String input) {
        Map<Character, Integer> charCountMap = new LinkedHashMap<>();

        for (char c : input.toCharArray()) {
            charCountMap.put(c, charCountMap.getOrDefault(c, 0) + 1);
        }

        for (Map.Entry<Character, Integer> entry : charCountMap.entrySet()) {
            if (entry.getValue() == 1) {
                return entry.getKey();
            }
        }
```

```
        return '\0';  // return null character if no non-repeated character
    }

    public static void main(String[] args) {
        String input = "aabbccddeffg";
        char result = findFirstNonRepeatedChar(input);
        System.out.println("First non-repeated character: " + result);
    }
}
```

OUTPUT:

First non-repeated character: e

4) Write a Java program that merges two sorted lists of integers into a single sorted list.

CODE:

```
package org.Q1;

import java.util.ArrayList;
import java.util.Arrays;
import java.util.List;

public class MergeSortedLists {
    public static List<Integer> mergeSortedLists(List<Integer> list1, List<Integer> list2) {
        List<Integer> mergedList = new ArrayList<>();
        int i = 0, j = 0;

        // Merge the two lists
        while (i < list1.size() && j < list2.size()) {
```

```
        if (list1.get(i) < list2.get(j)) {
            mergedList.add(list1.get(i));
            i++;
        } else {
            mergedList.add(list2.get(j));
            j++;
        }
    }

    // Add remaining elements from list1
    while (i < list1.size()) {
        mergedList.add(list1.get(i));
        i++;
    }

    // Add remaining elements from list2
    while (j < list2.size()) {
        mergedList.add(list2.get(j));
        j++;
    }

    return mergedList;
}

public static void main(String[] args) {
    List<Integer> list1 = Arrays.asList(1, 3, 5, 7);
    List<Integer> list2 = Arrays.asList(2, 4, 6, 8);
```

```
        List<Integer> mergedList = mergeSortedLists(list1, list2);
        System.out.println("Merged List: " + mergedList);
    }
}
```

OUTPUT:

```
Merged List: [1, 2, 3, 4, 5, 6, 7, 8]
```