LAB # 3:

LAB TASKS:

1.Write a program that takes two arrays of size 4 and swap the elements of those arrays.

```
public class Main {
    public static void main(String[] args) {
        int[] array1 = {1, 2, 3, 4};
        int[] array2 = {5, 6, 7, 8};
        System.out.println("Original Arrays: ");
        System.out.println("Array 1: ");
        displayArray(array1);
        System.out.println("Array 2: ");
        displayArray(array2);
         for (int i = 0; i < 4; i++) {
            int temp = array1[i];
            array1[i] = array2[i];
            array2[i] = temp;
        }
        System.out.println("\nAfter Swapping:");
        System.out.println("Array 1: ");
        displayArray(array1);
        System.out.println("Array 2: ");
        displayArray(array2);
    }
    public static void displayArray(int[] array) {
        for (int num : array) {
            System.out.print(num + " ");
        }
        System.out.println();
    }
}
```

```
Original Arrays:
Array 1:
1 2 3 4
Array 2:
5 6 7 8

After Swapping:
Array 1:
5 6 7 8
Array 2:
1 2 3 4
```

2.Add a method in the class that takes array and merge it with the existing one.

```java
public class Main{
    public static void main(String[] args){
        int [] b = {3,4,5,6};
        int[] c = {7,8,9,0};
        int[] a = new int[8];
        for (int i=0; i<4 ; i++){
            a[i] = b[i];
            a[i+4]=c[i];
        }
        for (int i : a){
            System.out.print(i+" ");
        }
    }
}
```

```
3 4 5 6 7 8 9 0
```

3. In a java program , take an array of type string and then check whether the strings are palindrome or not.

```java
public class Main{
    public static void main(String[] args){
        String [] b = {"Sahil" , "Haris" , "Shayan", "mam"};
        for (String c : b){
            if (a(c)){
                System.out.println(c + " is  palindrome");
            }
            else{
                System.out.println(c + " is not palindrome");
            }
        }
}
    public static boolean a(String c){
        StringBuilder D = new StringBuilder (c).reverse();
        return c.equals(D.toString());
    }
    }
```

```
Sahil is not palindrome
Haris is not palindrome
Shayan is not palindrome
mam is  palindrome
```

4.Given an array of integers, count how many numbers are even and how many are odd.

```java
public class Main {
    public static void main(String[] args) {
        int[] Sahil= {1, 2, 3, 4, 5, 6};
        int even= 0;
        int odd= 0;
        for (int num : Sahil) {
            if (num % 2 == 0) {
                even++;
            } else {
                odd++;
            }
        }
        System.out.println("Total even numbers: " + even);
        System.out.println("Total odd numbers: " + odd);
    }
}
```

```
Total even numbers: 3
Total odd numbers: 3
```

5. Given two integer arrays , merge them and remove any duplicate values from the resulting array.

```java
import java.util.*;
public class Main {
    public static void main(String[] args) {
      int[] a = {1, 3, 5, 7};
       int[] b = {2, 3, 6, 7, 8};
       Set<Integer> c= new HashSet<>();
       for(int num : a) c.add(num);
       for(int num : b) c.add(num);
       System.out.println("Array:" + c);
    }
}
```

```
Array:[1, 2, 3, 5, 6, 7, 8]
```

Home Tasks:

1.Write a program to take an array pf real numbers having size 7 and calculate the sum and mean of all the elements. Also depict the memory management of the task.

```java
import java.util.*;
public class Main {
   public static void main(String[] args) {
     double[] a = new double[7];
     double S = 0 ;
      Scanner input = new Scanner(System.in);
      System.out.println("Enter 7 Numbers:");
      for(int i = 0; i< 7 ; i++){
         a[i] = input.nextDouble();
         S+= a[i];
      }
      double m = S/7;
      System.out.println("Sum:" + S);
      System.out.println("Mean:" + m);

   }
}
```

```
5
6
7
8
9
2
3
```

```
Enter 7 Numbers:
Sum:40.0
Mean:5.714285714285714
```

2. Add a method in the same class that splits the existing array into two. The method should search a key in array and if found splits the array from that index of the key.

```java
import java.util.*;

public class Main {
    public static void main(String[] args) {
        double[] a = new double[7];
        double S = 0;
        Scanner input = new Scanner(System.in);

        System.out.println("Enter 7 Numbers:");
        for (int i = 0; i < 7; i++) {
            a[i] = input.nextDouble();
            S += a[i];
        }

        double m = S / 7;
        System.out.println("Sum: " + S);
        System.out.println("Mean: " + m);
        System.out.println("Enter a key");
        double key = input.nextDouble();

        abc(a, key);

        input.close();
    }

    public static void abc(double[] array, double key) {
        int index = -1;
```

```java
for (int i = 0; i < array.length; i++) {
    if (array[i] == key) {
        index = i;
        break;
    }
}

if (index == -1) {
    System.out.println("Key not found");
    return;
}

System.out.println("First Part:");
for (int i = 0; i < index; i++) {
    System.out.println(array[i]);
}

System.out.println("Second Part:");
for (int i = index; i < array.length; i++) {
    System.out.println(array[i]);
}
}
```

```
Enter 7 Numbers:
Sum: 40.0
Mean: 5.714285714285714
Enter a key
First Part:
5.0
6.0
Second Part:
7.0
8.0
9.0
2.0
3.0
```

3. Give an array of distinct integer and a target integer, return all unique combinations of numbers that add up to the target. Each number can be used only once in the combination.

```java
import java.util.*;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.println("Enter the size of array:");
        int n = input.nextInt();
        int[] a = new int[n];
        System.out.println("Enter " + n + " distinct integers:");
        for (int i = 0; i < n; i++) {
            a[i] = input.nextInt();
        }
        System.out.println("Enter the target sum:");
        int t = input.nextInt();

        List<List<Integer>> r = Combinations(a, t);
        System.out.println("Unique combinations:");
        for (List<Integer> combination : r) {
            System.out.println(combination);
        }
    }

    public static List<List<Integer>> Combinations(int[] numbers, int target) {
        List<List<Integer>> result = new ArrayList<>();
        Arrays.sort(numbers);
        backtrack(result, new ArrayList<>(), numbers, target, 0);
        return result;
    }

    private static void backtrack(List<List<Integer>> result, List<Integer> tempList, int[] a, int target, int s
        if (target == 0) {
            result.add(new ArrayList<>(tempList));
            return;
        }
        for (int i = start; i < a.length; i++) {
            if (a[i] > target) break;
            tempList.add(a[i]);
            backtrack(result, tempList, a, target - a[i], i + 1);
            tempList.remove(tempList.size() - 1);
        }
    }
}
```

```
Enter the size of array:
Enter 5 distinct integers:
Enter the target sum:
Unique combinations:
[3, 7]
[4, 6]
```

4. You are given an array containing n distinct numbers taken from 0,1,2….n. Write a program to find the one number that is missing from the array.

```java
import java.util.*;
public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.println("Enter the size of array:");
        int n = input.nextInt();
        int[] a = new int[n];
        System.out.println("Enter " + n + " distinct integers:");
       int sum=0;
        for (int i = 0; i < n; i++) {
            a[i] = input.nextInt();
           sum += a[i];
        }
        int ExpectedSum =  n* (n+1) / 2;
        System.out.println("The missing number is:" + (ExpectedSum - sum));
    }

}
```

```
Enter the size of array:
Enter 5 distinct integers:
The missing number is: 4
```

5.You are given an array of integers. Write a program to sort the array such that it follow a zigzag pattern : the first element is less

than the second , the second is greater is greater than third and so on.

```java
import java.util.*;
public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.println("Enter the size of array:");
        int n = input.nextInt();
        int[] a = new int[n];
        System.out.println("Enter " + n + " integers:");
        for (int i = 0; i < n; i++) {
            a[i] = input.nextInt();
             }
       for (int i = 0; i < n-1; i++) {
          if(i%2==0 && a[i]>a[i+1]){
             int temp = a[i];
             a[i]=a[i+1];
             a[i+1] = temp;
          }
          else if (i% 2 != 0 && a[i] < a[i+1]){
             int temp = a[i];
             a[i]=a[i+1];
             a[i+1] = temp;
          }
          }
        System.out.println("Zigzag sorted array:");
        for(int num : a){
            System.out.println(num + "");
        }
```

```
Enter the size of array:
Enter 5 integers:
Zigzag sorted array:
1
3
2
6
5
```