Assignment 3

Program 1: Even or Odd

```java
import java.util.Scanner;


public class even_or_odd {
    public static void main(String args[]) {

        // Creating a Scanner object to read input from the console

        Scanner scan = new Scanner(System.in);


        // Declaring an array to store 10 numbers

        int[] numbers = new int[10];


        // Prompting the user to enter 10 numbers

        for (int i = 0; i < 10; i++) {

            System.out.println("Please enter a number ");

            // Reading the number input from the user and storing it in the
numbers array

            numbers[i] = scan.nextInt();

        }


        // Closing the Scanner object to prevent resource leak

        scan.close();


        // Calling the checkNum method to count even and odd numbers

        checkNum(numbers);

    }


    // Method to check whether each number in the array is even or odd

    private static void checkNum(int[] numbers) {

        // Variables to store the counts of even and odd numbers

        int even = 0;
```

```java
        int odd = 0;


        // Iterating through the numbers array
        for (int i = 0; i < numbers.length; i++) {
            // Checking if the current number is even
            if (numbers[i] % 2 == 0) {
                even += 1; // Incrementing the count of even numbers
            } else {
                odd += 1; // Incrementing the count of odd numbers
            }
        }


        // Displaying the count of even and odd numbers
        System.out.println("There were " + even + " even numbers");
        System.out.println("There were " + odd + " odd numbers");
    }
}
```
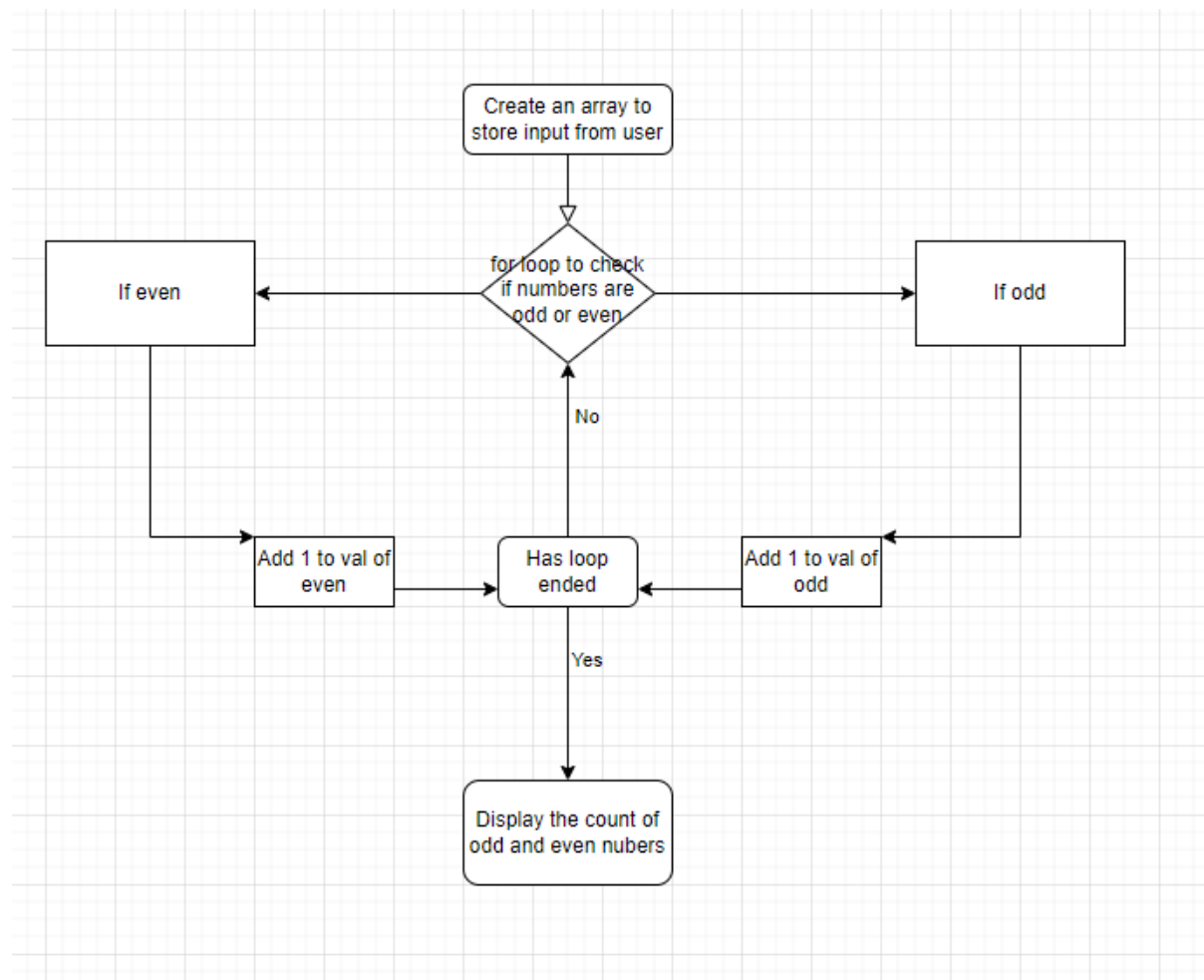
```
Please enter a number
1
Please enter a number
2
Please enter a number
3
Please enter a number
4
Please enter a number
5
Please enter a number
6
Please enter a number
7
Please enter a number
8
Please enter a number
9
Please enter a number
10
There were 5 even numbers
There were 5 odd numbers
```

Program 2: Standard Deviation

```java
import java.util.Scanner;


public class standard_deviation {

    public static void main(String args[]) {

        Scanner scan = new Scanner(System.in);


        // Prompting the user to enter a real number

        System.out.println("Please enter a Real number ");

        int N = scan.nextInt();


        // Creating an array to store N numbers

        double[] array = new double[N];


        // Looping to input N numbers
```

```java
        for (int i = 0; i < N; i++) {

            // Prompting the user to enter each value

            System.out.println("Please enter value #" + (i + 1) + ": ");

            array[i] = scan.nextDouble();

        }


        // Calculating the standard deviation of the entered numbers

        double StdDev = calcStdDev(array);


        // Displaying the calculated standard deviation

        System.out.println("The Standard deviation of N numbers is " +
StdDev);


        // Closing the Scanner object to prevent resource leak

        scan.close();

    }


    // Method to calculate the standard deviation

    public static double calcStdDev(double[] array) {

        double mean = calcmean(array);


        // Variable to store the sum of squared differences

        double sumOfSquaredDifferences = 0;


        for (double value : array) {

            sumOfSquaredDifferences += Math.pow(value - mean, 2);

        }


        // Calculating the standard deviation using the formula

        double std = sumOfSquaredDifferences / (array.length - 1);


        return Math.sqrt(std);
```
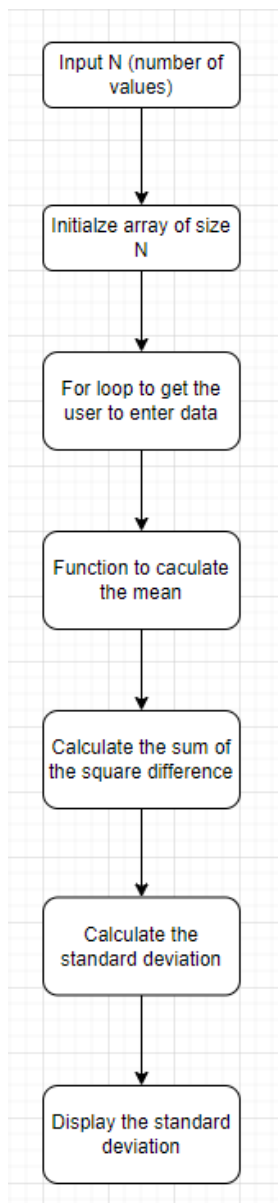
```java
    }


    // Method to calculate the mean of an array

    public static double calcmean(double[] array) {

        // Calculating the sum of all elements in the array

        double sum = 0.0;

        for (int i = 0; i < array.length; i++) {

            sum += array[i];

        }

        // Calculating the mean by dividing the sum by the number of elements

        return sum / array.length;

    }

}
```

```
Please enter a Real number
5
Please enter value #1:
1
Please enter value #2:
2
Please enter value #3:
3
Please enter value #4:
45
Please enter value #5:
5
The Standard deviation of N numbers is 18.95257238477141
```

```
Input N (number of
values)

Initialze array of size
N

For loop to get the
user to enter data

Function to caculate
the mean

Calculate the sum of
the square difference

Calculate the
standard deviation

Display the standard
deviation
```

Program 3: Names

```java
import java.util.Scanner;


public class Alphabetical {

    public static void main(String args[]) {

        // Creating a Scanner object to read input from the console

        Scanner scan = new Scanner(System.in);


        // Declaring an array to store 10 names

        String[] names = new String[10];
```

```java
        // Prompting the user to enter 10 names

        System.out.println("Please enter 10 names ");

        for (int i = 0; i < 10; i++) {

            System.out.print("Name " + (i + 1) + ": ");

            // Reading the name input from the user and storing it in the
names array

            String inputName = scan.nextLine();

            String capitalized = inputName.substring(0, 1).toUpperCase() +
inputName.substring(1);

            names[i] = capitalized;

        }


        // Sorting the names array in alphabetical order

        for (int i = 0; i < names.length - 1; i++) {

            for (int j = 0; j < names.length - i - 1; j++) {

                if (names[j].compareTo(names[j + 1]) > 0) {

                    // Swap names[j] and names[j + 1]

                    String temp = names[j];

                    names[j] = names[j + 1];

                    names[j + 1] = temp;

                }

            }

        }


        // Displaying the names in alphabetical order

        System.out.println("The names in alphabetical order");

        for (String name : names) {

            System.out.println(name);

        }


        // Closing the Scanner object to prevent resource leak
```
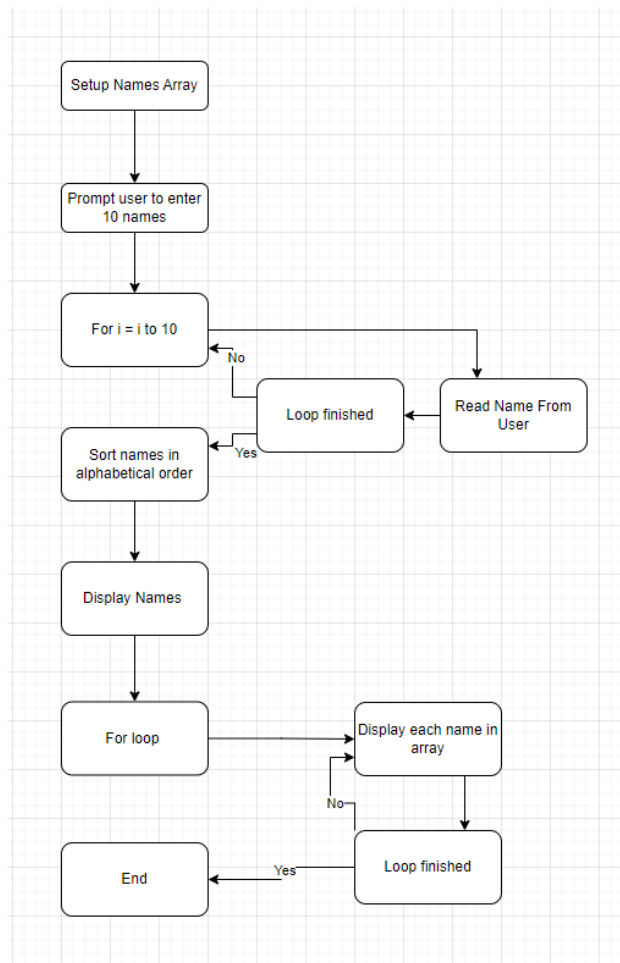
```java
        scan.close();

    }

}
```

```
Please enter 10 names
Name 1: John
Name 2: Mark
Name 3: Harry
Name 4: James
Name 5: Danny
Name 6: Daniel
Name 7: Sarah
Name 8: Jane
Name 9: Mary
Name 10: Cian
The names in alphabetical order
Cian
Daniel
Danny
Harry
James
Jane
John
Mark
Mary
Sarah
```

Program 4: Adding Matrices

```java
import java.util.Scanner;

public class matrix_addition {
    public static void main(String[] args) {
        // Creating a Scanner object to read input from the console
        Scanner scan = new Scanner(System.in);

        // Prompting the user to enter elements for the 1st matrix
        System.out.println("Enter elements for the 1st matrix");
        int[][] matrix1 = enter_matrix(scan);

        // Prompting the user to enter elements for the 2nd matrix
```

```java
        System.out.println("Enter elements for the 2nd matrix");

        int[][] matrix2 = enter_matrix(scan);


        // Adding the two matrices

        int[][] sum_matrix = add_matrix(matrix1, matrix2);


        // Displaying the sum of the matrices

        System.out.println("The sum of the matrices is:");

        display(sum_matrix);


        // Closing the Scanner object to prevent resource leak

        scan.close();

    }


    // Method to enter elements for a matrix

    public static int[][] enter_matrix(Scanner scan) {

        // Creating a 3x3 matrix

        int[][] matrix = new int[3][3];


        // Looping through rows and columns to input elements

        for (int i = 0; i < 3; i++) {

            for (int j = 0; j < 3; j++) {

                // Prompting the user to enter an element at a specific
position

                System.out.print("Enter element at position (" + (i + 1) + "."
+ (j + 1) + "): ");

                matrix[i][j] = scan.nextInt();

            }

        }

        return matrix;

    }
```

```java
    // Method to add two matrices
    public static int[][] add_matrix(int[][] matrix1, int[][] matrix2) {

        // Creating a matrix to store the sum of the matrices
        int[][] sum_matrix = new int[3][3];


        // Looping through rows and columns to add corresponding elements of
the matrices
        for (int i = 0; i < 3; i++) {
            for (int j = 0; j < 3; j++) {
                // Adding corresponding elements from matrix1 and matrix2 and
storing the result in sum_matrix
                sum_matrix[i][j] = matrix1[i][j] + matrix2[i][j];

            }
        }
        return sum_matrix;

    }


    // Method to display a matrix
    public static void display(int[][] matrix) {
        // Looping through rows and columns to display the elements of the
matrix
        for (int i = 0; i < 3; i++) {
            for (int j = 0; j < 3; j++) {
                // Printing each element of the matrix followed by a space
                System.out.print(matrix[i][j] + " ");
            }
            System.out.println();
        }
    }
}
```
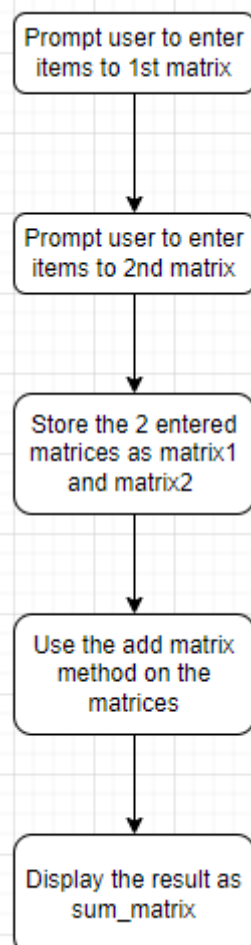
```
Enter elements for the 1st matrix
Enter element at position (1.1): 1
Enter element at position (1.2): 2
Enter element at position (1.3): 3
Enter element at position (2.1): 4
Enter element at position (2.2): 5
Enter element at position (2.3): 6
Enter element at position (3.1): 4
Enter element at position (3.2): 7
Enter element at position (3.3): 8
Enter elements for the 2nd matrix
Enter element at position (1.1): 1
Enter element at position (1.2): 2
Enter element at position (1.3): 3
Enter element at position (2.1): 5
Enter element at position (2.2): 4
Enter element at position (2.3): 6
Enter element at position (3.1): 7
Enter element at position (3.2): 5
Enter element at position (3.3): 1
The sum of the matrices is:
2 4 6
9 9 12
11 12 9
```

Prompt user to enter items to 1st matrix

↓

Prompt user to enter items to 2nd matrix

↓

Store the 2 entered matrices as matrix1 and matrix2

↓

Use the add matrix method on the matrices

↓

Display the result as sum_matrix

Program 5: Transpose Matrix

```java
import java.util.Scanner;

public class transpose_matrix {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);


        // Input for the matrix

        System.out.println("Enter the number of rows:");

        int rows = scanner.nextInt();

        System.out.println("Enter the number of columns:");

        int columns = scanner.nextInt();

        int[][] matrix = new int[rows][columns];


        // Input elements of the matrix

        System.out.println("Enter elements of the matrix:");

        for (int i = 0; i < rows; i++) {

            for (int j = 0; j < columns; j++) {

                System.out.print("Enter element at position (" + (i + 1) + ","
+ (j + 1) + "): ");

                matrix[i][j] = scanner.nextInt();

            }

        }


        // Display original matrix

        System.out.println("\nOriginal matrix:");

        displayMatrix(matrix);


        // Transpose the matrix

        int[][] transposeMatrix = transpose(matrix);


        // Display transpose matrix
```

```java
        System.out.println("\nTranspose matrix:");

        displayMatrix(transposeMatrix);


        scanner.close();

    }


    // Method to compute transpose of a matrix

    public static int[][] transpose(int[][] matrix) {

        int rows = matrix.length;

        int columns = matrix[0].length;


        int[][] transposeMatrix = new int[columns][rows];


        for (int i = 0; i < columns; i++) {

            for (int j = 0; j < rows; j++) {

                transposeMatrix[i][j] = matrix[j][i];

            }

        }


        return transposeMatrix;

    }


    // This method displays the matrix

    public static void displayMatrix(int[][] matrix) {

        int rows = matrix.length;

        int columns = matrix[0].length;


        for (int i = 0; i < rows; i++) {

            for (int j = 0; j < columns; j++) {

                System.out.print(matrix[i][j] + " ");

            }
```

```java
            System.out.println();
        }
    }
}
```
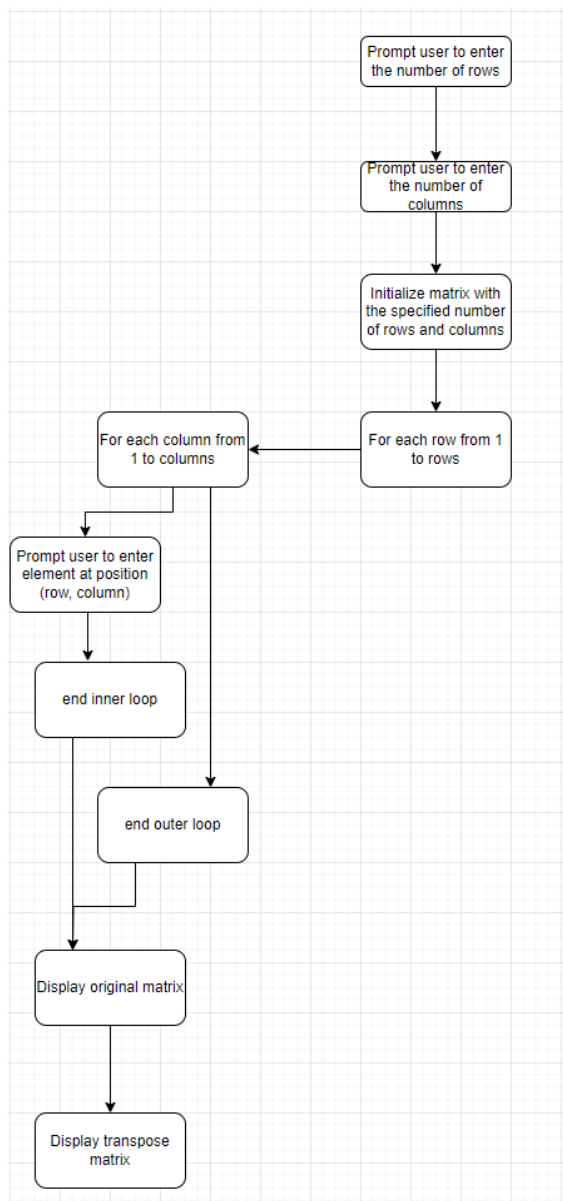
```
Enter the number of rows:
3
Enter the number of columns:
2
Enter elements of the matrix:
Enter element at position (1,1): 1
Enter element at position (1,2): 2
Enter element at position (2,1): 3
Enter element at position (2,2): 4
Enter element at position (3,1): 5
Enter element at position (3,2): 6

Original matrix:
1 2
3 4
5 6

Transpose matrix:
1 3 5
2 4 6
```

Program 6: 3d Array

```java
import java.util.Scanner;


public class ThreeD_array {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);


        // Create and display the 3D array

        int[][][] array3D = create3DArray();

        System.out.println("3D Array:");
```

```java
        display3DArray(array3D);

        // Input a number from the user
        System.out.print("\nEnter a number to search in the array: ");
        int to_find = scanner.nextInt();

        // Check if the number is present in the array
        boolean found = search3DArray(array3D, to_find);

        if (found) {
            System.out.println("The number " + to_find + " is present in the
array.");
        } else {
            System.out.println("The number " + to_find + " is not present in
the array.");
        }

        scanner.close();
    }

    // Method to create a 3D array
    public static int[][][] create3DArray() {
        int[][][] array3D = {
            { {1, 2, 3}, {4, 5, 6}, {7, 8, 9} },
            { {10, 11, 12}, {13, 14, 15}, {16, 17, 18} },
            { {19, 20, 21}, {22, 23, 24}, {25, 26, 27} }
        };
        return array3D;
    }

    // Method to display a 3D array
    public static void display3DArray(int[][][] array3D) {
```

```java
        for (int[][] matrix2D : array3D) {

            for (int[] row : matrix2D) {

                for (int element : row) {

                    System.out.print(element + " ");

                }

                System.out.println();

            }

            System.out.println();

        }

    }


    // Method to search for a number in a 3D array
    public static boolean search3DArray(int[][][] array3D, int to_find) {

        for (int[][] matrix2D : array3D) {

            for (int[] row : matrix2D) {

                for (int element : row) {

                    if (element == to_find) {

                        return true; // Number found

                    }

                }

            }

        }

        return false; // Number not found

    }

}
```

```
3D Array:
1 2 3
4 5 6
7 8 9

10 11 12
13 14 15
16 17 18

19 20 21
22 23 24
25 26 27


Enter a number to search in the array: 5
The number 5 is present in the array.
```

Create 3d array

↓

display the array

↓

Prompt the user to enter a number to search for

↓

If number is found ← If else statement → Else

Display The number is present

Display the number isn't present

End