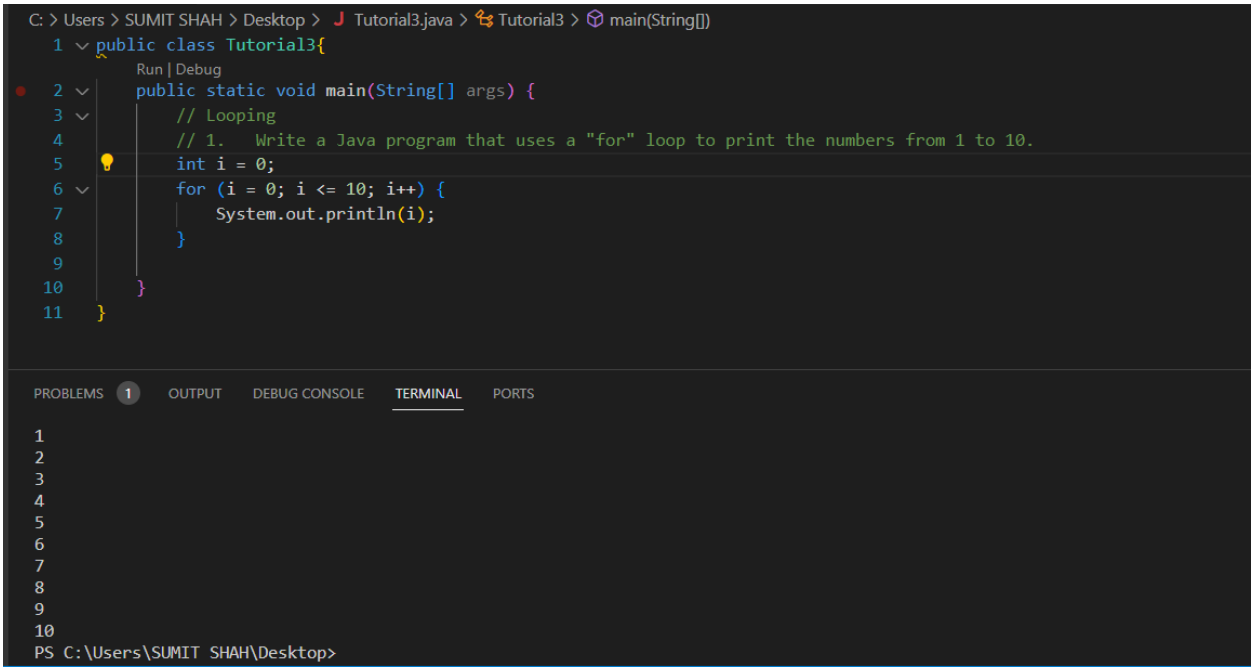
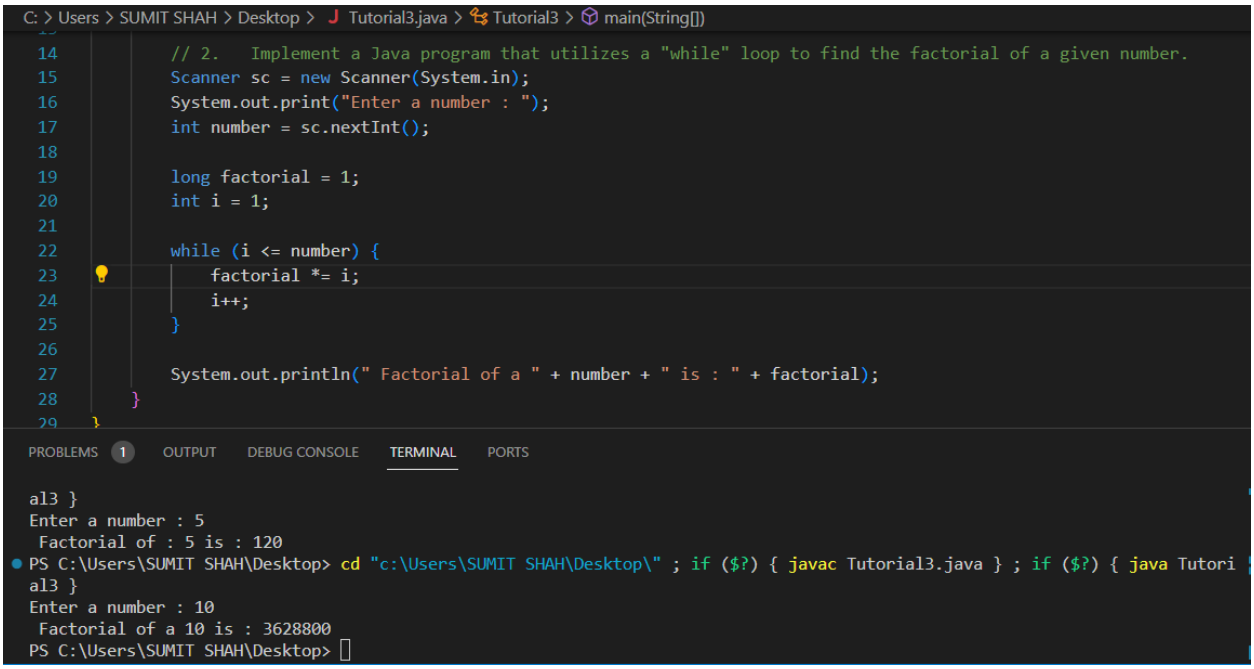
Looping:

1. Write a Java program that uses a "for" loop to print the numbers from 1 to 10.



2. Implement a Java program that utilizes a "while" loop to find the factorial of a given number.



3. Create a Java program using a "do-while" loop to repeatedly ask the user for input until they enter a specific value (e.g., 0).

```java
34
35          // 3.   Create a Java program using a "do-while" loop to repeatedly ask the user for input until they enter
36          Scanner sc = new Scanner(System.in);
37          int n;
38          do{
39              System.out.print("Enter a number(0-Exit) : ");
40              n =sc.nextInt();
41              System.out.println(n);
42          } while(n != 0); {
43          System.out.println("Thank you");}
44          sc.close();
45      }
46  }
```

```
PROBLEMS 1  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

Enter a number(0-Exit) : 1
1
Enter a number(0-Exit) : 20
20
Enter a number(0-Exit) : 0
0
Thank you
PS C:\Users\SUMIT SHAH\Desktop>
```

4. Write a Java program that demonstrates the use of nested loops to print a pattern, such as a pyramid of stars.

```
C: > Users > SUMIT SHAH > Desktop > Tutorial3.java > Tutorial3 > main(String[])
```

```java
53          // 4.  Write a Java program that demonstrates the use of nested loops to print a pattern, such as a pyramid
54          int rows = 5;
55          for (int i = 1; i <= rows; i++) {
56              for (int j = 1; j <= rows - i; j++) {
57                  System.out.print(s:" ");
58              }
59              for(int k = 1; k <= 2 * i - 1; k++) {
60                  System.out.print(s:"*");
61              }
62              System.out.println();
63
64          }
65
66      }
67
```

```
PROBLEMS 1  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

PS C:\Users\SUMIT SHAH> cd "c:\Users\SUMIT SHAH\Desktop\" ; if ($?) { javac Tutorial3.java } ; if ($?) { java Tutorial3 }
    *
   ***
  *****
 *******
*********
PS C:\Users\SUMIT SHAH\Desktop>
```

Arrays:

5. Develop a Java program that declares and initializes an array of integers. Print the elements of the array in reverse order.

```java
        // 5.   Develop a Java program that declares and initializes an array of integers.
        // Print the elements of the array in reverse order.

            int [] array = new int [] {1, 2, 3, 4, 5};
            System.out.print(s:"Original array : ");
            for (int i=0; i<array.length; i++) {
                System.out.print(array[i] + " ");
            }
            System.out.println();
            System.out.print(s:"Array in reverse order : ");
            for(int i=array.length-1; i>=0; i--) {
                System.out.print(array[i]+" ");
            }


    }
}
```

```
PROBLEMS 1  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS        Run: Workshop2

PS C:\Users\SUMIT SHAH>  & 'C:\Program Files\Java\jdk-20\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\SUMIT SHAH\
AppData\Local\Temp\vscodesws_254ef\jdt_ws\jdt.ls-java-project\bin' 'Workshop2'
Original array : 1 2 3 4 5
Array in reverse order : 5 4 3 2 1
PS C:\Users\SUMIT SHAH>
```

6. Implement a Java program that finds the sum and average of elements in an array of floating-point numbers.

```java



    //6.    Implement a Java program that finds the sum and average of elements in an array of floating-point numbers.
    int marks [] = {40, 50, 60, 70, 80};
    int sum = 0;
    for(int i=0; i<marks.length; i++){
        sum += marks[i];
    }
    System.out.println("Sum of a Array : " + sum);
    double average = (sum / marks.length);
    System.out.println("Average of an Array : " + average);


```

```
PROBLEMS 1  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

  symbol:   variable array
  location: class Tutorial3
1 error
PS C:\Users\SUMIT SHAH\Desktop> cd "c:\Users\SUMIT SHAH\Desktop\" ; if ($?) { javac Tutorial3.java } ; if ($?) { java Tutori
al3 }
Sum of a Array : 300
Average of an Array : 60.0
PS C:\Users\SUMIT SHAH\Desktop>
```

7. Write a Java program that checks if a given element is present in an array of strings. If present, print its index; otherwise, print a message indicating its absence.
8. Create a Java program that sorts an array of integers in ascending order using the bubble sort algorithm.

```java
// 8.   Create a Java program that sorts an array of integers
// in ascending order using the bubble sort algorithm.

public static void bubbleSort(int arr[]) {
for (int turn = 0; turn < arr.length - 1; turn++) {
    for (int j = 0; j < arr.length - 1 - turn; j++) {
        if (arr[j] > arr[j + 1]) {
            // SWAP
            int temp = arr[j];
            arr[j] = arr[j + 1];
            arr[j + 1] = temp;
        }
    }
}
}

public static void printArr(int arr[]) {
    for (int i = 0; i < arr.length; i++) {
        System.out.print(arr[i] + " ");
    }
    System.out.println();
}
```

```java
public static void printArr(int arr[]) {
    for (int i = 0; i < arr.length; i++) {
        System.out.print(arr[i] + " ");
    }
    System.out.println();
}

Run | Debug
public static void main(String[] args) {
    int arr[] = {5, 4, 1, 2, 3};
    bubbleSort(arr);
    printArr(arr);
}

}
```

```
PROBLEMS 1  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

PS C:\Users\SUMIT SHAH>  & 'C:\Program Files\Java\jdk-20\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\SUMIT SHAH\AppData\Local\Temp\vscodesws_254ef\jdt_ws\jdt.ls-java-project\bin' 'Week3'
1 2 3 4 5
PS C:\Users\SUMIT SHAH>
```

Enhanced For Loop:

9. Develop a Java program that uses the enhanced for loop to iterate through an array of characters and count the number of vowels.

```java
// 9.   Develop a Java program that uses the enhanced for loop to iterate through an array of characters and c
Scanner sc = new Scanner(System.in);
System.out.println(x:"Enter the STRING : ");
String line = sc.nextLine();
int vowels = 0;

line = line.toLowerCase(); // Convert the input to lowercase

for (int i = 0; i < line.length(); ++i) {
    char ch = line.charAt(i);

    // check if character is any of a, e, i, o, u
    if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' || ch == 'u') {
        ++vowels;
    }
}
System.out.println("Vowels: " + vowels);

}
```

```
PROBLEMS 2  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS
Enter the STRING :
My name is Sumit Shah.
Vowels: 6
PS C:\Users\SUMIT SHAH\Desktop>
```

10. Write a Java program that uses the enhanced for loop to find the maximum value in an array of doubles.

```java
// Method to find the largest value in an array and print the smallest
public static double getLargest(double numbers[]) {
    // Initialize the largest variable with the smallest possible double value
    double largest = Double.MIN_VALUE;
    // Initialize the smallest variable with the largest possible double value
    double smallest = Double.MAX_VALUE;

    // Loop through each element in the array
    for (double num : numbers) {
        // Check if the current element is greater than the current largest
        if (largest < num) {
            // Update the largest if the current element is greater
            largest = num;
        }
        // Check if the current element is smaller than the current smallest
        if (smallest > num) {
            // Update the smallest if the current element is smaller
            smallest = num;
        }
    }

    // Print the smallest value
    System.out.println("Smallest value is: " + smallest);
```

```java
        // Print the smallest value
        System.out.println("Smallest value is: " + smallest);

        // Return the largest value after the loop completes
        return largest;
    }

    // Main method
    Run | Debug
    public static void main(String args[]) {
        // Array of numbers
        double numbers[] = {1.2, 2.5, 3.6, 4.7, 5.8, 20.9};

        // Call the getLargest method and print the result
        System.out.println("Largest value is: " + getLargest(numbers));
    }
}
```

```
PS C:\Users\SUMIT SHAH\OneDrive - University of Wolverhampton\Desktop> cd "c:\Users\SUMIT SHAH\OneDrive - University of Wolv
erhampton\Desktop\" ; if ($?) { javac workshop.java } ; if ($?) { java workshop }
Smallest value is: 1.2
Largest value is: 20.9
PS C:\Users\SUMIT SHAH\OneDrive - University of Wolverhampton\Desktop>
```

11. Implement a Java program that initializes a 2D array and uses an enhanced for loop to calculate the sum of all elements.

```java
public static void main(String[] args) {
    // Initialize a 2D array
    int[][] matrix = {
        {1, 2, 3},
        {4, 5, 6},
        {7, 8, 9}
    };

    // Calculate the sum of all elements using an enhanced for loop
    int sum = calculateSum(matrix);

    // Print the result
    System.out.println("The sum of all elements in the 2D array is: " + sum);
}

// Method to calculate the sum of all elements in a 2D array
public static int calculateSum(int[][] array) {
    int sum = 0;

    // Use enhanced for loops to iterate through the rows and columns
    for (int[] row : array) {
```

```java
                // Use enhanced for loops to iterate through the rows and columns
                for (int[] row : array) {
                    for (int element : row) {
                        // Add each element to the sum
                        sum += element;
                    }
                }

                // Return the final sum
                return sum;
            }
        // }

}
```

```
BLEMS 1   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS

sum of all elements in the 2D array is: 45
```

12. Create a Java program that utilizes the enhanced for loop to concatenate all strings in an array and print the result.

```java
public static void main(String[] args) {
    // Initialize an array of strings
    String[] words = {"Hello", ", ", "how", " ", "are", " ", "you", "?"};

    // Concatenate all strings using an enhanced for loop
    String concatenatedString = concatenateStrings(words);

    // Print the result
    System.out.println("Concatenated String: " + concatenatedString);
}

// Method to concatenate all strings in an array
public static String concatenateStrings(String[] array) {
    // Initialize an empty string to store the concatenated result
    StringBuilder result = new StringBuilder();
```

```java
        // Print the result
        System.out.println("Concatenated String: " + concatenatedString);
    }

    // Method to concatenate all strings in an array
    public static String concatenateStrings(String[] array) {
        // Initialize an empty string to store the concatenated result
        StringBuilder result = new StringBuilder();

        // Use enhanced for loop to iterate through the array
        for (String word : array) {
            // Append each string to the result
            result.append(word);
        }
        // Convert StringBuilder to String and return the result
        return result.toString();
    }

}
```

```
PROBLEMS 1  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

Concatenated String: Hello, how are you?
PS C:\Users\SUMIT SHAH\OneDrive - University of Wolverhampton\Desktop>
```