Lab Report

Course Code: CIS216L

Course Title: Object Oriented Programming Lab

Submitted to

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Level-1: Let's program

1.Write a program to get the following output. Hey there, I am data!

Code:

```java
class Problem1 {
    public static void main(String[] args) {
            System.out.println("Hello there,\nI am data!");
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab\Assign
2023)\Object Oriented Programming\lab\Assignment-1\Level-1\src\" ; if
va Problem1 }
Hello there,
I am data!
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab\Assign
```

2. Write a program to print

*

**

***

****

on screen.

Code:

```java
public class Problem2 {
    public static void main(String[] args) {
        int rows = 4;

        for (int i = 1; i <= rows; i++) {
            for (int j = 1; j <= i; j++) {
                System.out.print("*");
            }
            System.out.println();
        }
    }
}
```

Output:

```
                  1 error
                  PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Prog
                  all-2023)\Object Oriented Programming\lab\Assignment
                  { java Problem2 }
                  *
                  **
                  ***
                  ****
                  PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Prog
0    tabnine starter
```

3. Print the following pattern on the screen

```
*****
 ***
  *
 ***
*****
```

Code:

```java
public class Problem3 {
    public static void main(String[] args) {
        int n = 5;

        for (int i = 1; i <= n; i += 2) {
            for (int j = 1; j <= (n - i) / 2; j++) {
                System.out.print(" ");
            }
            for (int k = 1; k <= i; k++) {
                System.out.print("*");
            }
            System.out.println();
        }

        for (int i = n - 2; i >= 1; i -= 2) {
            for (int j = 1; j <= (n - i) / 2; j++) {
                System.out.print(" ");
            }
            for (int k = 1; k <= i; k++) {
                System.out.print("*");
            }
            System.out.println();
        }
    }
}
```

```
}
```

Output:

4. Write a program to print the sum of the numbers 2, 4 and 5.

Code:

```java
public class Problem4 {
    public static void main(String[] args) {
        int number1 = 2;
        int number2 = 4;
        int number3 = 5;

        int sum = number1 + number2 + number3;

        System.out.println("The sum of " + number1 + ", " + number2 + ", and "
+ number3 + " is: " + sum);
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\la
all-2023)\Object Oriented Programming\lab\Assignment-1\Level-1
{ java Problem4 }
The sum of 2, 4, and 5 is: 11
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\la
tabnine starter
```

5. Write a program to print the difference and product of the numbers 45 and 32

Code:

```java
public class Problem5 {
    public static void main(String[] args) {
        int number1 = 45;
        int number2 = 32;

        int difference = number1 - number2;

        int product = number1 * number2;

        System.out.println("The difference of " + number1 + " and " + number2
+ " is: " + difference);
```

```
        System.out.println("The product of " + number1 + " and " + number2 + "
is: " + product);
    }
}
```

Output:

```
1 error
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab\
all-2023)\Object Oriented Programming\lab\Assignment-1\Level-1\s
{ java Problem5 }
The difference of 45 and 32 is: 13
The product of 45 and 32 is: 1440
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab\
```

Level-2: Know Data-types

1. Write a Java program to print an int, a double and a char on screen.

Code:

```java
public class Problem1 {
    public static void main(String[] args) {
        int intValue = 42;
        double doubleValue = 3.14;
        char charValue = 'A';

        System.out.println("Integer value: " + intValue);
        System.out.println("Double value: " + doubleValue);
        System.out.println("Character value: " + charValue);
    }
}
```

Output:

```
Character value: A
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented
bject Oriented Programming\lab\Assignment-1\Lev
Integer value: 42
Double value: 3.14
Character value: A
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented
```

2. Write a program to print the area of a rectangle of sides 2 and 3 units respectively.

Code:

```java
public class Problem2 {
    public static void main(String[] args) {
        double length = 2.0;
        double width = 3.0;
        double area = length * width;
        System.out.println("The area of the rectangle is: " + area + " square
units");
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspot\bin\jav
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\
The area of the rectangle is: 6.0 square units
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\
```

3. Write a program to print the product of the numbers 8.2 and 6.

Code:

```java
public class Problem3 {
    public static void main(String[] args) {
        double num1 = 8.2;
        double num2 = 6.0;
        double product = num1 * num2;
        System.out.println("The product of " + num1 + " and " + num2 + " is: "
+ product);
    }
}
```

Output:

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspot\bin\java.e
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab
The product of 8.2 and 6.0 is: 49.199999999999996
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab
```

4. Print the ASCII value of the character 'h'.

Code:

```java
public class Problem4 {
    public static void main(String[] args) {
        char character = 'h';
        int asciiValue = (int) character;
        System.out.println("The ASCII value of 'h' is: " + asciiValue);
    }
}
```

Output:

```
 PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Pro
 Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspo
 ' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Pro
 The ASCII value of 'h' is: 104
 PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Pro
```

5. Write a program to assign a value of 100.235 to a double variable and then convert it to int.

Code:

```java
public class Problem5 {
    public static void main(String[] args) {
        double doubleValue = 100.235;
        int intValue = (int) doubleValue;

        System.out.println("Double value: " + doubleValue);
        System.out.println("Integer value after conversion: " + intValue);
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Progra
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspot\b
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Progra
Double value: 100.235
Integer value after conversion: 100
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Progra
```

6. Write a program to add 3 to the ASCII value of the character 'd' and print the equivalent character.

Code:

```java
public class Problem6 {
    public static void main(String[] args) {
        char character = 'd';
        int asciiValue = (int) character;
        int newAsciiValue = asciiValue + 3;
        char newCharacter = (char) newAsciiValue;

        System.out.println("Original character: " + character);
        System.out.println("ASCII value of 'd': " + asciiValue);
        System.out.println("New character: " + newCharacter);
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object Orien
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7
' 'D:\CIS\Semester-4(Fall-2023)\Object Orien
Original character: d
ASCII value of 'd': 100
New character: g
PS D:\CIS\Semester-4(Fall-2023)\Object Orien
```

7. Write a program to add an integer variable having value 5 and a double variable having value 6.2.

Code:

```java
public class Problem7 {
    public static void main(String[] args) {
        int intValue = 5;
        double doubleValue = 6.2;
        double sum = intValue + doubleValue;

        System.out.println("Integer value: " + intValue);
        System.out.println("Double value: " + doubleValue);
        System.out.println("Sum: " + sum);
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-ho
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented
Integer value: 5
Double value: 6.2
Sum: 11.2
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented
```

8. Write a program to find the square of the number 3.9.

Code:

```java
public class Problem8 {
    public static void main(String[] args) {
        double number = 3.9;
        double square = number * number;

        System.out.println("The square of " + number + " is: " + square);
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspo
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Prog
The square of 3.9 is: 15.209999999999999
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Prog
```

Level 3: Java Operators

1. Length and breadth of a rectangle are 5 and 7 respectively. Write a program to calculate the area and perimeter of the rectangle

Code:

```java
public class Problem1 {
    public static void main(String[] args) {
        double length = 5.0;
        double breadth = 7.0;
        double area = length * breadth;
        double perimeter = 2 * (length + breadth);
        System.out.println("Length of the rectangle: " + length + " units");
        System.out.println("Breadth of the rectangle: " + breadth + " units");
        System.out.println("Area of the rectangle: " + area + " square
units");
        System.out.println("Perimeter of the rectangle: " + perimeter + "
units");
    }
}
```

Output:

```
ams\Eclipse Adoptium\jdk-17.0.8.7-hotspot\bin\java.exe' '-XX:+ShowCod
all-2023)\Object Oriented Programming\lab\Assignment-1\Level-3\bin' '
Length of the rectangle: 5.0 units
Breadth of the rectangle: 7.0 units
Area of the rectangle: 35.0 square units
Perimeter of the rectangle: 24.0 units
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab\Assig
```

2. Write a program to calculate the perimeter of a triangle having sides of length 2,3 and 5 units

Code:

```java
public class Problem2 {
    public static void main(String[] args) {
        double side1 = 2.0;
        double side2 = 3.0;
        double side3 = 5.0;
        double perimeter = side1 + side2 + side3;
        System.out.println("Side 1 length: " + side1 + " units");
        System.out.println("Side 2 length: " + side2 + " units");
        System.out.println("Side 3 length: " + side3 + " units");
        System.out.println("Perimeter of the triangle: " + perimeter + "
units");
```

```
        }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object Orient
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-
' 'D:\CIS\Semester-4(Fall-2023)\Object Orient
Side 1 length: 2.0 units
Side 2 length: 3.0 units
Side 3 length: 5.0 units
Perimeter of the triangle: 10.0 units
PS D:\CIS\Semester-4(Fall-2023)\Object Orient
```

3. Write a program to add 8 to the number 2345 and then divide it by 3. Now, the modulus of the quotient is taken with 5 and then multiply the resultant value by 5. Display the final result

Code:

```
public class Problem3 {
    public static void main(String[] args) {
        int number = 2345;
        int result = (((number + 8) / 3) % 5) * 5;

        System.out.println("Final result: " + result);
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk
' 'D:\CIS\Semester-4(Fall-2023)\Obj
Final result: 20
PS D:\CIS\Semester-4(Fall-2023)\Obj
```

4. Now, solve the above question using assignment operators (eg. +=, -=, *=)

Code:

```
public class Problem4 {
    public static void main(String[] args) {
        int number = 2345;
        number += 8;
```

```
        number /= 3;
        number %= 5;
        number *= 5;

        System.out.println("Final result: " + number);
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\O
Local\Programs\Eclipse Adoptium\j
' 'D:\CIS\Semester-4(Fall-2023)\O
Final result: 20
PS D:\CIS\Semester-4(Fall-2023)\O
```

5. Write a program to check if the two numbers 23 and 45 are equal

Code:

```
public class Problem5 {
    public static void main(String[] args) {
        int num1 = 23;
        int num2 = 45;

        if (num1 == num2) {
            System.out.println("The numbers are equal.");
        } else {
            System.out.println("The numbers are not equal.");
        }
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object Or
Local\Programs\Eclipse Adoptium\jdk-17.0.
' 'D:\CIS\Semester-4(Fall-2023)\Object Or
The numbers are not equal.
PS D:\CIS\Semester-4(Fall-2023)\Object Or
```

6. Write a program to print the power of 7 raised to 5
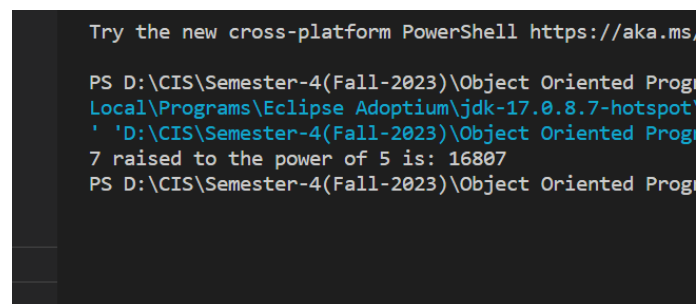
Code:

```java
public class Problem6 {
    public static void main(String[] args) {
        int base = 7;
        int exponent = 5;

        long result = 1;

        for (int i = 0; i < exponent; i++) {
            result *= base;
        }

        System.out.println("7 raised to the power of 5 is: " + result);
    }
}
```

Output:

```
Try the new cross-platform PowerShell https://aka.ms/
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Prog
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspot`
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Prog
7 raised to the power of 5 is: 16807
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Prog
```

7. Assign values of variables 'a' and 'b' as 55 and 70 respectively and then check if both the conditions 'a < 50' and 'a < b' are true

Code:

```java
public class Problem7 {
    public static void main(String[] args) {
        int a = 55;
        int b = 70;

        boolean condition1 = a < 50;
        boolean condition2 = a < b;

        if (condition1 && condition2) {
            System.out.println("Both conditions are true.");
        } else {
            System.out.println("At least one condition is false.");
        }
}
```

```
        }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object O
Local\Programs\Eclipse Adoptium\jdk-17.0
' 'D:\CIS\Semester-4(Fall-2023)\Object O
At least one condition is false.
PS D:\CIS\Semester-4(Fall-2023)\Object O
```

8. Now solve the above question to check if atleast one of the conditions 'a < 50' or 'a < b' is true

Code:

```java
public class Problem8 {
    public static void main(String[] args) {
        int a = 55;
        int b = 70;

        boolean condition1 = a < 50;
        boolean condition2 = a < b;

        if (condition1 || condition2) {
            System.out.println("At least one condition is true.");
        } else {
            System.out.println("Both conditions are false.");
        }
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.
' 'D:\CIS\Semester-4(Fall-2023)\Object
At least one condition is true.
PS D:\CIS\Semester-4(Fall-2023)\Object
```

9. If the marks of Robert in three subjects are 78,45 and 62 respectively (each out of 100), write a program to calculate his total marks and percentage marks.

Code:

```java
public class Problem9 {
    public static void main(String[] args) {
        int subject1Marks = 78;
        int subject2Marks = 45;
        int subject3Marks = 62;
        int totalMarks = subject1Marks + subject2Marks + subject3Marks;

        int maxMarksPerSubject = 100;
        double percentage = (double) totalMarks / (3 * maxMarksPerSubject) *
100;

        System.out.println("Marks in Subject 1: " + subject1Marks);
        System.out.println("Marks in Subject 2: " + subject2Marks);
        System.out.println("Marks in Subject 3: " + subject3Marks);
        System.out.println("Total Marks: " + totalMarks);
        System.out.println("Percentage Marks: " + percentage + "%");
    }
}
```

Output:

```
' 'D:\CIS\Semester-4(Fall-2023)\Object Orient
Marks in Subject 1: 78
Marks in Subject 2: 45
Marks in Subject 3: 62
Total Marks: 185
Percentage Marks: 61.66666666666667%
PS D:\CIS\Semester-4(Fall-2023)\Object Orient
```

10. Suppose the values of variables 'a' and 'b' are 6 and 8 respecrtively, write two programs to swap the values of the two variables. 1 - first program by using a third variable 2 - second program without using any third variable

Code:

```java
public class Problem101 {
    public static void main(String[] args) {
        int a = 6;
        int b = 8;
        int temp;

        System.out.println("Before swapping:");
        System.out.println("a = " + a);
```

```java
        System.out.println("b = " + b);

        temp = a;
        a = b;
        b = temp;

        System.out.println("\nAfter swapping using a third variable:");
        System.out.println("a = " + a);
        System.out.println("b = " + b);
    }
}

public class Problem102 {
    public static void main(String[] args) {
        int a = 6;
        int b = 8;

        System.out.println("Before swapping:");
        System.out.println("a = " + a);
        System.out.println("b = " + b);

        a = a + b;
        b = a - b;
        a = a - b;

        System.out.println("\nAfter swapping without using a third
variable:");
        System.out.println("a = " + a);
        System.out.println("b = " + b);
    }
}
```

Output:

```
'D:\CIS\Semester-4(Fall-2023)\Object Orie
Before swapping:
a = 6
b = 8

After swapping using a third variable:
a = 8
b = 6
PS D:\CIS\Semester-4(Fall-2023)\Object Orie
```

11. Write a program to convert Fahrenheit into Celsius

Code:

```java
public class Problem11 {
    public static void main(String[] args) {
        double fahrenheit = 98.6;

        double celsius = (fahrenheit - 32) * 5/9;

        System.out.println(fahrenheit + " degrees Fahrenheit is equal to " +
celsius + " degrees Celsius.");
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspot\bin\ja
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming
98.6 degrees Fahrenheit is equal to 37.0 degrees Celsius.
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming
```

12. The total number of students in a class are 90 out of which 45 are boys. If 50% of the total students secured grade 'A' out of which 20 are boys, then write a program to calculate the total number of girls getting grade 'A'

Code:

```java
public class Problem12 {
    public static void main(String[] args) {
        int totalStudents = 90;
        int totalBoys = 45;
        double percentageGradeA = 50.0;
        int gradeABoys = 20;

        double totalGradeA = (percentageGradeA / 100) * totalStudents;

        int totalGirls = totalStudents - totalBoys;
        int gradeAGirls = (int) (totalGradeA - gradeABoys);

        System.out.println("Total number of girls getting grade 'A': " +
gradeAGirls);
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hot
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented
Total number of girls getting grade 'A': 25
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented
```

13. Write a program to calculate the sum of the first and the second last digit of a 5 digit.
E.g.- NUMBER : 12345 OUTPUT : 1+4=5

Code:

```java
import java.util.Scanner;

public class Problem13 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a 5-digit number: ");
        int number = scanner.nextInt();
        scanner.close();

        if (number >= 10000 && number <= 99999) {
            int firstDigit = number / 10000;
            int secondLastDigit = (number / 10) % 10;
            int sum = firstDigit + secondLastDigit;

            System.out.println("Sum of the first and second last digit: " +
sum);
        } else {
            System.out.println("Please enter a valid 5-digit number.");
        }
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-ho
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented
Enter a 5-digit number: 12345
Sum of the first and second last digit: 5
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented
```

14. Take a 4 digit number. Write a program to display a number whose digits are 2 greater than the corresponding digits of the number TAKEN

Code:

```java
import java.util.Scanner;

public class Problem14 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a 4-digit number: ");
        int originalNumber = scanner.nextInt();
        scanner.close();

        if (originalNumber >= 1000 && originalNumber <= 9999) {
            int digit1 = (originalNumber / 1000 + 2) % 10;
            int digit2 = ((originalNumber / 100) % 10 + 2) % 10;
            int digit3 = ((originalNumber / 10) % 10 + 2) % 10;
            int digit4 = (originalNumber % 10 + 2) % 10;

            int resultNumber = digit1 * 1000 + digit2 * 100 + digit3 * 10 +
digit4;

            System.out.println("Original number: " + originalNumber);
            System.out.println("Displayed number: " + resultNumber);
        } else {
            System.out.println("Please enter a valid 4-digit number.");
        }
    }
}
```

Output:

```
  ' 'D:\CIS\Semester-4(Fall-2023)\Object
 Enter a 4-digit number: 4321
 Original number: 4321
 Displayed number: 6543
 PS D:\CIS\Semester-4(Fall-2023)\Object
```

15. Take a 4 digit number. Write a program to display a number whose digits are 2 greater than the corresponding digits of the number TAKEN

Code:

```java
import java.util.Scanner;

public class Problem15 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
```

```java
        System.out.print("Enter a 3-digit number: ");
        int number = scanner.nextInt();
        scanner.close();

        if (number >= 100 && number <= 999) {
            int digit1 = number / 100;
            int digit2 = (number / 10) % 10;
            int digit3 = number % 10;

            int sum = digit1 + digit2 + digit3;

            System.out.println("Sum of the digits: " + sum);
        } else {
            System.out.println("Please enter a valid 3-digit number.");
        }
    }
}
```

Output:

```
'  'D:\CIS\Semester-4(Fall-2023)\Object
Enter a 3-digit number: 123
Sum of the digits: 6
PS D:\CIS\Semester-4(Fall-2023)\Object
```

16. Write a program to reverse a 3-digit number. E.g.-Number : 132 Output : 231

Code:

```java
import java.util.Scanner;

public class Problem16 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a 3-digit number: ");
        int number = scanner.nextInt();
        scanner.close();

        if (number >= 100 && number <= 999) {
            int digit1 = number / 100;
            int digit2 = (number / 10) % 10;
            int digit3 = number % 10;

            int reversedNumber = digit3 * 100 + digit2 * 10 + digit1;
```

```java
            System.out.println("Original number: " + number);
            System.out.println("Reversed number: " + reversedNumber);
        } else {
            System.out.println("Please enter a valid 3-digit number.");
        }
    }
}
```

Output:

```
' 'D:\CIS\Semester-4(Fall-2023)\Obje
Enter a 3-digit number: 432
Original number: 432
Reversed number: 234
PS D:\CIS\Semester-4(Fall-2023)\Obje
```

Level 4: Input by user

1. Write a program to take two integer inputs from user and print sum and product of them.

Code:

```java
import java.util.Scanner;

public class Problem1 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the first integer: ");
        int num1 = scanner.nextInt();
        System.out.print("Enter the second integer: ");
        int num2 = scanner.nextInt();
        scanner.close();
        int sum = num1 + num2;
        int product = num1 * num2;
        System.out.println("Sum: " + sum);
        System.out.println("Product: " + product);
    }
}
```

Output:

```
all-2023)\Object Oriented Programming\lab\Assignment-
Enter the first integer: 12
Enter the second integer: 23
Sum: 35
Product: 276
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Prog
```

2. Take two integer inputs from user. First calculate the sum of two then product of two. Finally, print the sum and product of both obtained results

Code:

```java
import java.util.Scanner;

public class Problem2 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the first integer: ");
        int num1 = scanner.nextInt();
        System.out.print("Enter the second integer: ");
        int num2 = scanner.nextInt();
        int sum = num1 + num2;
```

```
        int product = num1 * num2;
        int sumOfResults = sum + product;
        int productOfResults = sum * product;
        System.out.println("Sum of the two numbers: " + sum);
        System.out.println("Product of the two numbers: " + product);
        System.out.println("Sum of results: " + sumOfResults);
        System.out.println("Product of results: " + productOfResults);
        scanner.close();
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspo
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Pro
Enter the first integer: 23
Enter the second integer: 46
Sum of the two numbers: 69
Product of the two numbers: 1058
Sum of results: 1127
Product of results: 73002
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Pro
```

3. Ask user to give two double input for length and breadth of a rectangle and print area type casted to int.

Code:

```
import java.util.Scanner;

public class Problem3 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the length of the rectangle: ");
        double length = scanner.nextDouble();
        System.out.print("Enter the breadth of the rectangle: ");
        double breadth = scanner.nextDouble();
        double area = length * breadth;
        int areaAsInteger = (int) area;
        System.out.println("Area of the rectangle (type-casted to int): " +
areaAsInteger);
        scanner.close();
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspot\bin\
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Programmi
Enter the length of the rectangle: 34
Enter the breadth of the rectangle: 43
Area of the rectangle (type-casted to int): 1462
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programmi
```

4. Take name, roll number and field of interest from user and print in the format below : Hey, my name is xyz and my roll number is xyz. My field of interest are xyz.

Code:

```java
import java.util.Scanner;

public class Problem4 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter your name: ");
        String name = scanner.nextLine();

        System.out.print("Enter your roll number: ");
        String rollNumber = scanner.nextLine();

        System.out.print("Enter your field of interest: ");
        String fieldOfInterest = scanner.nextLine();

        System.out.println("Hey, my name is " + name + " and my roll number is
" + rollNumber + ". My field of interest is " + fieldOfInterest + ".");

        scanner.close();
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspot\bin\java.exe     -XX:+ShowCodeDeta
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab\Assignment-1\Level-4\
Enter your name: Motiullah
Enter your roll number: 123
Enter your field of interest: Money
Hey, my name is Motiullah and my roll number is 123. My field of interest is Money.
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab\Assignment-1\Level-4>
```

5. Take side of a square from user and print area and perimeter of it.

Code:

```java
import java.util.Scanner;

public class Problem5 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the side length of the square: ");
        double sideLength = scanner.nextDouble();

        double area = sideLength * sideLength;
        double perimeter = 4 * sideLength;

        System.out.println("Area of the square: " + area);
        System.out.println("Perimeter of the square: " + perimeter);

        scanner.close();
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hots
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented F
Enter the side length of the square: 435
Area of the square: 189225.0
Perimeter of the square: 1740.0
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented F
```

6. Write a program to find square of a number. E.g.- INPUT : 2 OUTPUT : 4 INPUT : 5 OUTPUT : 25

Code:

```java
import java.util.Scanner;

public class Problem6 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a number: ");
```

```java
        double number = scanner.nextDouble();

        double square = number * number;

        System.out.println("Square of the number: " + square);

        scanner.close();
    }
}
```

Output:

7. Take two different string input and print them in same line

Code:

```java
import java.util.Scanner;

public class Problem7 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the first string: ");
        String firstString = scanner.nextLine();

        System.out.print("Enter the second string: ");
        String secondString = scanner.nextLine();

        String concatenatedString = firstString + secondString;

        System.out.println("Concatenated string: " + concatenatedString);

        scanner.close();
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotsp
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Pro
Enter the first string: hi
Enter the second string: hello
Concatenated string: hihello
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Pro
```

8. Take 3 inputs from user and check : all are equal any of two are equal

Code:

```java
import java.util.Scanner;

public class Problem8 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the first number: ");
        int num1 = scanner.nextInt();

        System.out.print("Enter the second number: ");
        int num2 = scanner.nextInt();

        System.out.print("Enter the third number: ");
        int num3 = scanner.nextInt();

        boolean allEqual = num1 == num2 && num2 == num3;
        boolean anyTwoEqual = num1 == num2 || num1 == num3 || num2 == num3;

        if (allEqual) {
            System.out.println("All three numbers are equal.");
        } else if (anyTwoEqual) {
            System.out.println("Any two of the three numbers are equal.");
        } else {
            System.out.println("None of the numbers are equal.");
        }

        scanner.close();
    }
}
```

Output:

9. Write a program to enter the values of two variables 'a' and 'b' from keyboard and then check if both the conditions 'a < 50' and 'a < b' are true

Code:

```java
import java.util.Scanner;

public class Problem9 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the value of 'a': ");
        int a = scanner.nextInt();

        System.out.print("Enter the value of 'b': ");
        int b = scanner.nextInt();

        boolean condition1 = a < 50;
        boolean condition2 = a < b;

        if (condition1 && condition2) {
            System.out.println("Both conditions are true.");
        } else {
            System.out.println("At least one condition is false.");
        }

        scanner.close();
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspo
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Pro
Enter the value of 'a': 34
Enter the value of 'b': 34
At least one condition is false.
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Pro
```

10. If the marks of Robert in three subjects are entered through keyboard (each out of 100), write a program to calculate his total marks and percentage marks.

Code:

```java
import java.util.Scanner;

public class Problem10 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the marks for the first subject (out of 100): ");
        int subject1Marks = scanner.nextInt();

        System.out.print("Enter the marks for the second subject (out of 100): ");
        int subject2Marks = scanner.nextInt();

        System.out.print("Enter the marks for the third subject (out of 100): ");
        int subject3Marks = scanner.nextInt();

        int totalMarks = subject1Marks + subject2Marks + subject3Marks;

        double percentageMarks = (totalMarks / 300.0) * 100.0;

        System.out.println("Total Marks: " + totalMarks);
        System.out.println("Percentage Marks: " + percentageMarks + "%");

        scanner.close();
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspot\bin\java.e
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab
Enter the marks for the first subject (out of 100): 99
Enter the marks for the second subject (out of 100): 98
Enter the marks for the third subject (out of 100): 99
Total Marks: 296
Percentage Marks: 98.66666666666667%
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab
```

Level 5: Decide if or else

1. Take values of length and breadth of a rectangle from user and check if it is square or not.

Code:

```java
import java.util.Scanner;

public class Problem1 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the length of the rectangle: ");
        double length = scanner.nextDouble();

        System.out.print("Enter the breadth of the rectangle: ");
        double breadth = scanner.nextDouble();

        boolean isSquare = length == breadth;

        if (isSquare) {
            System.out.println("It is a square.");
        } else {
            System.out.println("It is not a square.");
        }

        scanner.close();
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented
ams\Eclipse Adoptium\jdk-17.0.8.7-hotspot\bin\j
all-2023)\Object Oriented Programming\lab\Assig
Enter the length of the rectangle: 554
Enter the breadth of the rectangle: 65
It is not a square.
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented
```

2. Take two int values from user and print greatest among them.

Code:

```java
import java.util.Scanner;

public class Problem2 {
```

```java
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the first integer: ");
        int num1 = scanner.nextInt();

        System.out.print("Enter the second integer: ");
        int num2 = scanner.nextInt();

        int greatest = (num1 > num2) ? num1 : num2;

        System.out.println("The greatest number is: " + greatest);

        scanner.close();
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Obje
Local\Programs\Eclipse Adoptium\jdk-
' 'D:\CIS\Semester-4(Fall-2023)\Obje
Enter the first integer: 3
Enter the second integer: 5
The greatest number is: 5
PS D:\CIS\Semester-4(Fall-2023)\Obje
```

3. A shop will give discount of 10% if the cost of purchased quantity is more than 1000. Ask user for quantity Suppose, one unit will cost 100. Judge and print total cost for user

Code:

```java
import java.util.Scanner;

public class Problem3 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the quantity of units purchased: ");
        int quantity = scanner.nextInt();

        int unitCost = 100;
```

```java
        int totalCost = quantity * unitCost;

        if (totalCost > 1000) {
            double discount = 0.10 * totalCost;
            totalCost -= discount;
        }

        System.out.println("Total cost for the user: " + totalCost);

        scanner.close();
    }
}
```

Output:

4. A company decided to give bonus of 5% to employee if his/her year of service is more than 5 years. Ask user for their salary and year of service and print the net bonus amount

Code:

```java
import java.util.Scanner;

public class Problem4 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter your salary: ");
        double salary = scanner.nextDouble();

        System.out.print("Enter your years of service: ");
        int yearsOfService = scanner.nextInt();

        double bonus = 0.0;

        if (yearsOfService > 5) {
            bonus = 0.05 * salary;
        }

        System.out.println("Net bonus amount: " + bonus);
```
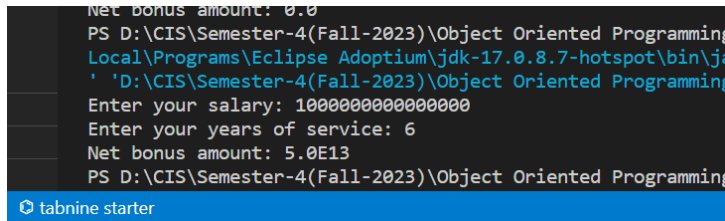
```
            scanner.close();
    }
}
```

Output:

5. A school has following rules for grading system: a. Below 25 - F b. 25 to 45 - E c. 45 to 50 - D d. 50 to 60 - C e. 60 to 80 - B f. Above 80 - A Ask user to enter marks and print the corresponding grade

Code:

```java
import java.util.Scanner;

public class Problem5 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter your marks: ");
        int marks = scanner.nextInt();
        char grade;

        if (marks < 25) {
            grade = 'F';
        } else if (marks >= 25 && marks < 45) {
            grade = 'E';
        } else if (marks >= 45 && marks < 50) {
            grade = 'D';
        } else if (marks >= 50 && marks < 60) {
            grade = 'C';
        } else if (marks >= 60 && marks < 80) {
            grade = 'B';
        } else {
            grade = 'A';
        }

        System.out.println("Your grade: " + grade);

        scanner.close();
    }
```

```
}
```

Output:

6. Take input of age of 3 people by user and determine oldest and youngest among them.

Code:

```java
import java.util.Scanner;

public class Problem6 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the age of person 1: ");
        int age1 = scanner.nextInt();

        System.out.print("Enter the age of person 2: ");
        int age2 = scanner.nextInt();

        System.out.print("Enter the age of person 3: ");
        int age3 = scanner.nextInt();

        int oldest = Math.max(age1, Math.max(age2, age3));
        int youngest = Math.min(age1, Math.min(age2, age3));

        System.out.println("Oldest person's age: " + oldest);
        System.out.println("Youngest person's age: " + youngest);

        scanner.close();
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object Orient
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-
' 'D:\CIS\Semester-4(Fall-2023)\Object Orient
Enter the age of person 1: 23
Enter the age of person 2: 24
Enter the age of person 3: 26
Oldest person's age: 26
Youngest person's age: 23
PS D:\CIS\Semester-4(Fall-2023)\Object Orient
```

7. Write a program to print absolute vlaue of a number entered by user. E.g.- INPUT: 1 OUTPUT: 1 INPUT: -1 OUTPUT: 1

Code:

```java
import java.util.Scanner;

public class Problem7 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a number: ");
        double number = scanner.nextDouble();

        double absoluteValue = Math.abs(number);

        System.out.println("Absolute value: " + absoluteValue);

        scanner.close();
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Obj
Local\Programs\Eclipse Adoptium\jdk
' 'D:\CIS\Semester-4(Fall-2023)\Obj
Enter a number: 242
Absolute value: 242.0
PS D:\CIS\Semester-4(Fall-2023)\Obj
```

8. A student will not be allowed to sit in exam if his/her attendence is less than 75%. Take following input from user Number of classes held Number of classes attended. And print percentage of class attended Is student is allowed to sit in exam or not.

Code:

```java
import java.util.Scanner;

public class Problem8 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the number of classes held: ");
        int totalClasses = scanner.nextInt();

        System.out.print("Enter the number of classes attended: ");
        int attendedClasses = scanner.nextInt();

        double attendancePercentage = (double) attendedClasses / totalClasses
* 100.0;

        System.out.println("Percentage of classes attended: " +
attendancePercentage + "%");

        if (attendancePercentage >= 75.0) {
            System.out.println("You are allowed to sit in the exam.");
        } else {
            System.out.println("You are not allowed to sit in the exam due to
low attendance.");
        }

        scanner.close();
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programmir
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspot\bin\j
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Programmir
Enter the number of classes held: 34
Enter the number of classes attended: 33
Percentage of classes attended: 97.05882352941177%
You are allowed to sit in the exam.
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programmir
```

9. Modify the above question to allow student to sit if he/she has medical cause. Ask user if he/she has medical cause or not ('Y' or 'N') and print accordingly.

Code:

```java
import java.util.Scanner;

public class Problem9 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the number of classes held: ");
        int totalClasses = scanner.nextInt();

        System.out.print("Enter the number of classes attended: ");
        int attendedClasses = scanner.nextInt();

        double attendancePercentage = (double) attendedClasses / totalClasses
* 100.0;

        System.out.println("Percentage of classes attended: " +
attendancePercentage + "%");

        scanner.nextLine();

        System.out.print("Do you have a medical cause? (Y/N): ");
        char medicalCause = scanner.nextLine().charAt(0);

        if (medicalCause == 'Y' || medicalCause == 'y') {
            System.out.println("You are allowed to sit in the exam due to a
medical cause.");
        } else if (attendancePercentage >= 75.0) {
            System.out.println("You are allowed to sit in the exam.");
        } else {
            System.out.println("You are not allowed to sit in the exam due to
low attendance.");
        }

        scanner.close();
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab\Assi
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspot\bin\java.exe'
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab\Assi
Enter the number of classes held: 23
Enter the number of classes attended: 12
Percentage of classes attended: 52.17391304347826%
Do you have a medical cause? (Y/N): y
You are allowed to sit in the exam due to a medical cause.
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\lab\Assi
```

```
> 🗘 tabnine starter                           Ln 33, Col 1 (1177 selec
```

10. If $x = 2$ $y = 5$ $z = 0$ then find values of the following expressions: a. $x == 2$ b. $x != 5$ c. $x != 5$ && $y >= 5$ d. $z != 0$ || $x == 2$ e. $!(y < 10)$

Code:

```java
public class Problem10 {
    public static void main(String[] args) {
        int x = 2;
        int y = 5;
        int z = 0;

        boolean resultA = x == 2;
        boolean resultB = x != 5;
        boolean resultC = x != 5 && y >= 5;
        boolean resultD = z != 0 || x == 2;
        boolean resultE = !(y < 10);

        System.out.println("a. x == 2: " + resultA);
        System.out.println("b. x != 5: " + resultB);
        System.out.println("c. x != 5 && y >= 5: " + resultC);
        System.out.println("d. z != 0 || x == 2: " + resultD);
        System.out.println("e. !(y < 10): " + resultE);
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.
' 'D:\CIS\Semester-4(Fall-2023)\Object
a. x == 2: true
b. x != 5: true
c. x != 5 && y >= 5: true
d. z != 0 || x == 2: true
e. !(y < 10): false
PS D:\CIS\Semester-4(Fall-2023)\Object
```

11. Write a program to check whether a entered character is lowercase (a to z) or uppercase (A to Z).

Code:

```java
import java.util.Scanner;

public class Problem11 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a character: ");
        char ch = scanner.next().charAt(0);

        if (ch >= 'a' && ch <= 'z') {
            System.out.println("The entered character is lowercase.");
        } else if (ch >= 'A' && ch <= 'Z') {
            System.out.println("The entered character is uppercase.");
        } else {
            System.out.println("The entered character is not a letter.");
        }

        scanner.close();
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Object Ori
Local\Programs\Eclipse Adoptium\jdk-17.0.8
' 'D:\CIS\Semester-4(Fall-2023)\Object Ori
Enter a character: s
The entered character is lowercase.
PS D:\CIS\Semester-4(Fall-2023)\Object Ori
```

Level 6: Loop

1. Take 10 integers from keyboard using loop and print their average value on the screen.

Code:

```java
import java.util.Scanner;

public class Problem1 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        int sum = 0;
        int count = 10;

        for (int i = 1; i <= count; i++) {
            System.out.print("Enter integer #" + i + ": ");
            int num = scanner.nextInt();
            sum += num;
        }

        double average = (double) sum / count;

        System.out.println("Average value: " + average);

        scanner.close();
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-
' 'D:\CIS\Semester-4(Fall-2023)\Obje
Enter integer #1: 234
Enter integer #2: 353
Enter integer #3: 213
Enter integer #4: 2345
Enter integer #5: 2
Enter integer #6: 1
Enter integer #7: 3
Enter integer #8: 5
Enter integer #9: 63
Enter integer #10: 5
Average value: 322.4
PS D:\CIS\Semester-4(Fall-2023)\Obje
```

2. Print the following patterns using loop:

a.

```
*
**
***
****
```

b.

```
  *
 ***
*****
 ***
  *
```

c.

```
1010101
 10101
  101
   1
```

Code:

```java
public class Problem2a {
    public static void main(String args[]){
        for (int i = 1; i <= 4; i++) {
            for (int j = 1; j <= i; j++) {
                System.out.print("*");
            }
            System.out.println();
        }

    }
}

public class Problem2b {
    public static void main(String args[]){
        int n = 3;
        for (int i = 1; i <= n; i++) {
            for (int j = 1; j <= n - i; j++) {
                System.out.print(" ");
            }
            for (int k = 1; k <= 2 * i - 1; k++) {
```

```java
                System.out.print("*");
            }
            System.out.println();
        }
        for (int i = n - 1; i >= 1; i--) {
            for (int j = 1; j <= n - i; j++) {
                System.out.print(" ");
            }
            for (int k = 1; k <= 2 * i - 1; k++) {
                System.out.print("*");
            }
            System.out.println();
        }


    }
}
public class Problem2c {
    public static void main(String args[]){
        int n = 4;

        for (int i = n; i > 0; i--) {
            for (int j = i; j < n; j++) {
                System.out.print(" ");
            }

            for (int k = 1; k <= 2 * i - 1; k++) {
                if (k % 2 == 0) {
                    System.out.print("0");
                } else {
                    System.out.print("1");
                }
            }

            System.out.println();
        }

    }
}
```
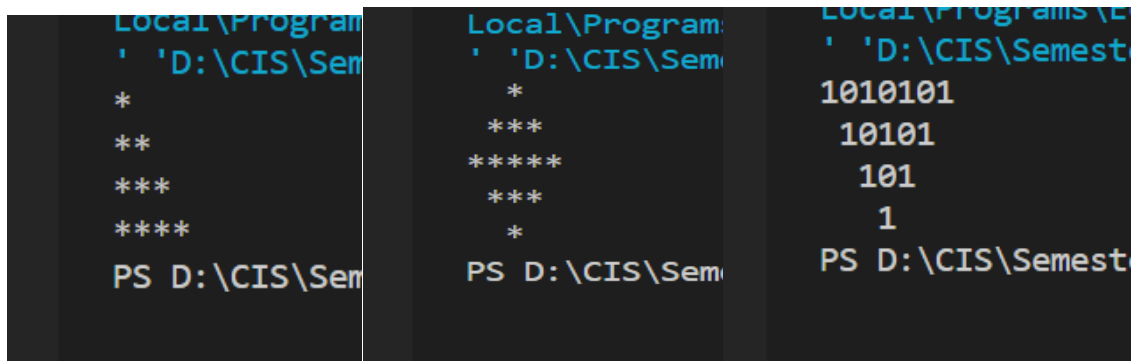
Output:

3. Print multiplication table of 24, 50 and 29 using loop.

Code:

```java
public class Problem3 {
    public static void main(String[] args) {
        int num1 = 24;
        int num2 = 50;
        int num3 = 29;

        System.out.println("Multiplication Table of " + num1 + ":");
        for (int i = 1; i <= 10; i++) {
            System.out.println(num1 + " x " + i + " = " + (num1 * i));
        }

        System.out.println("\nMultiplication Table of " + num2 + ":");
        for (int i = 1; i <= 10; i++) {
            System.out.println(num2 + " x " + i + " = " + (num2 * i));
        }

        System.out.println("\nMultiplication Table of " + num3 + ":");
        for (int i = 1; i <= 10; i++) {
            System.out.println(num3 + " x " + i + " = " + (num3 * i));
        }
    }
}
```

Output:

```
' 'D:\CIS\Semester-4(Fall-2023)\Object Or
Multiplication Table of 24:
24 x 1 = 24
24 x 2 = 48
24 x 3 = 72
24 x 4 = 96
24 x 5 = 120
24 x 6 = 144
24 x 7 = 168
24 x 8 = 192
24 x 9 = 216
24 x 10 = 240

Multiplication Table of 50:
50 x 1 = 50
50 x 2 = 100
50 x 3 = 150
50 x 4 = 200
50 x 5 = 250
50 x 6 = 300
50 x 7 = 350
50 x 8 = 400
50 x 9 = 450
50 x 10 = 500

Multiplication Table of 29:
29 x 1 = 29
29 x 2 = 58
29 x 3 = 87
29 x 4 = 116
29 x 5 = 145
29 x 6 = 174
29 x 7 = 203
29 x 8 = 232
29 x 9 = 261
29 x 10 = 290
PS D:\CIS\Semester-4(Fall-2023)\Object Or
```

4. Print ASCII values and their equivalent characters. ASCII value vary from 0 to 255.

Code:

```java
public class Problem4 {
    public static void main(String[] args) {
        System.out.println("ASCII Values and Their Equivalent Characters:");

        for (int i = 0; i <= 255; i++) {
            System.out.println("ASCII Value: " + i + " Character: " + (char)
i);
        }
    }
}
```

Output:

5. Factorial of any number n is represented by n! and is equal to 1*2*3*....*(n-1)*n. E.g.- 4! = 1*2*3*4 = 24 3! = 3*2*1 = 6 2! = 2*1 = 2 Also, 1! = 1 0! = 0 Write a Java program to calculate factorial of a number

Code:

```java
import java.util.Scanner;

public class Problem5 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a non-negative integer: ");
        int n = scanner.nextInt();

        long factorial = 1;

        if (n < 0) {
            System.out.println("Factorial is not defined for negative
numbers.");
        } else {
            for (int i = 1; i <= n; i++) {
                factorial *= i;
            }
            System.out.println(n + "! = " + factorial);
        }

        scanner.close();
    }
}
```

Output:

6. Write a program to find greatest common divisor (GCD) or highest common factor (HCF) of given two numbers

Code:

```java
import java.util.Scanner;

public class Problem6 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the first number: ");
        int num1 = scanner.nextInt();

        System.out.print("Enter the second number: ");
        int num2 = scanner.nextInt();

        int gcd = findGCD(num1, num2);

        System.out.println("GCD (HCF) of " + num1 + " and " + num2 + " is: " +
gcd);

        scanner.close();
    }

    public static int findGCD(int a, int b) {
        while (b != 0) {
            int temp = b;
            b = a % b;
            a = temp;
        }
        return a;
    }
}
```

Output:

7. Take integer inputs from user until he/she presses q (Ask to press q to quit after every integer input). Print average and product of all numbers.

Code:

```java
import java.util.Scanner;

public class Problem7 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        int sum = 0;
        int product = 1;
        int count = 0;

        while (true) {
            System.out.print("Enter an integer (or 'q' to quit): ");
            String input = scanner.next();

            if (input.equals("q")) {
                break;
            }

            try {
                int number = Integer.parseInt(input);
                sum += number;
                product *= number;
                count++;
            } catch (NumberFormatException e) {
                System.out.println("Invalid input. Please enter an integer or
'q' to quit.");
            }
        }

        if (count == 0) {
            System.out.println("No valid numbers entered.");
        } else {
            double average = (double) sum / count;
```

```
            System.out.println("Average of entered numbers: " + average);
            System.out.println("Product of entered numbers: " + product);
        }

        scanner.close();
    }
}
```

Output:

```
       '....... .................. .
     ' 'D:\CIS\Semester-4(Fall-2023)\Object Ori
    Enter an integer (or 'q' to quit): 33
    Enter an integer (or 'q' to quit): 23
    Enter an integer (or 'q' to quit): 5
    Enter an integer (or 'q' to quit): 2
    Enter an integer (or 'q' to quit): 5
    Enter an integer (or 'q' to quit): 1
    Enter an integer (or 'q' to quit): q
    Average of entered numbers: 11.5
    Product of entered numbers: 37950
    PS D:\CIS\Semester-4(Fall-2023)\Object Ori
```

8. Write an infinite loop. A inifinte loop never ends. Condition is always true.

Code:

```
public class Problem8 {
    public static void main(String[] args) {
        while (true) {
            System.out.println("This is an infinite loop.");
        }
    }
}
```

Output:

```
    PROBLEMS  1    OUTPUT    DEBUG CONSOLE

    This is an infinite loop.
    This is an infinite loop.
    This is an infinite loop.
    This is an infinite loop.
    This is an infinite loop.
    This is an infinite loop.
    This is an infinite loop.
    This is an infinite loop.
    This is an infinite loop.
    This is an infinite loop.
    This is an infinite loop.
    This is an infinite loop.
```

Level 7: Have your own methods

1. Define two methods to print the maximum and the minimum number respectively among three numbers entered by user.

Code:

```java
import java.util.Scanner;

public class Problem1 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the first number: ");
        double num1 = scanner.nextDouble();

        System.out.print("Enter the second number: ");
        double num2 = scanner.nextDouble();

        System.out.print("Enter the third number: ");
        double num3 = scanner.nextDouble();

        double max = findMax(num1, num2, num3);
        double min = findMin(num1, num2, num3);

        System.out.println("Maximum number among the three: " + max);
        System.out.println("Minimum number among the three: " + min);

        scanner.close();
    }

    public static double findMax(double a, double b, double c) {
        double max = a;
        if (b > max) {
            max = b;
        }
        if (c > max) {
            max = c;
        }
        return max;
    }

    public static double findMin(double a, double b, double c) {
        double min = a;
        if (b < min) {
            min = b;
        }
        if (c < min) {
            min = c;
```

```
        }
        return min;
    }
}
```

Output:

```
lipse Adoptium\jdk-17.0.8.7-hotspot\bin\java.exe'
ject Oriented Programming\lab\Assignment-1\Level-7
Enter the first number: 123
Enter the second number: 321
Enter the third number: 23
Maximum number among the three: 321.0
Minimum number among the three: 23.0
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Pr
```

2. Define a program to find out whether a given number is even or odd.

Code:

```java
import java.util.Scanner;

public class Problem2 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a number: ");
        int number = scanner.nextInt();

        if (isEven(number)) {
            System.out.println(number + " is even.");
        } else {
            System.out.println(number + " is odd.");
        }

        scanner.close();
    }

    public static boolean isEven(int number) {
        return number % 2 == 0;
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall
Local\Programs\Eclipse Ad
' 'D:\CIS\Semester-4(Fall
Enter a number: 23
23 is odd.
PS D:\CIS\Semester-4(Fall
```

3. A person is elligible to vote if his/her age is greater than or equal to 18. Define a method to find out if he/she is elligible to vote.

Code:

```java
import java.util.Scanner;

public class Problem3 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter your age: ");
        int age = scanner.nextInt();

        if (isEligibleToVote(age)) {
            System.out.println("You are eligible to vote.");
        } else {
            System.out.println("You are not eligible to vote.");
        }

        scanner.close();
    }

    public static boolean isEligibleToVote(int age) {
        return age >= 18;
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\
Local\Programs\Eclipse Adoptium\j
' 'D:\CIS\Semester-4(Fall-2023)\0
Enter your age: 23
You are eligible to vote.
PS D:\CIS\Semester-4(Fall-2023)\0
```

4. Write a program to print the sum of two numbers entered by user by defining your own method

Code:

```java
import java.util.Scanner;

public class Problem4 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the first number: ");
        double num1 = scanner.nextDouble();

        System.out.print("Enter the second number: ");
        double num2 = scanner.nextDouble();

        double sum = calculateSum(num1, num2);

        System.out.println("Sum of " + num1 + " and " + num2 + " is: " + sum);

        scanner.close();
    }

    public static double calculateSum(double a, double b) {
        return a + b;
    }
}
```

Output:

```
PS D:\CIS\Semester-4(Fall-2023)\Objec
Local\Programs\Eclipse Adoptium\jdk-1
' 'D:\CIS\Semester-4(Fall-2023)\Objec
Enter the first number: 123
Enter the second number: 123
Sum of 123.0 and 123.0 is: 246.0
PS D:\CIS\Semester-4(Fall-2023)\Objec
```

5. Define a method that returns the product of two numbers entered by user.

Code:

```java
import java.util.Scanner;

public class Problem5 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
```

```
        System.out.print("Enter the first number: ");
        double num1 = scanner.nextDouble();

        System.out.print("Enter the second number: ");
        double num2 = scanner.nextDouble();

        double product = calculateProduct(num1, num2);

        System.out.println("Product of " + num1 + " and " + num2 + " is: " +
product);

        scanner.close();
    }

    public static double calculateProduct(double a, double b) {
        return a * b;
    }
}
```

Output:

```
      'D:\CIS\Semester-4(Fall-2023)\Object
 Enter the first number: 42
 Enter the second number: 234
 Product of 42.0 and 234.0 is: 9828.0
 PS D:\CIS\Semester-4(Fall-2023)\Object
```

6. Define a method that returns the product of two numbers entered by user.

Code:

```java
import java.util.Scanner;

public class Problem6 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the radius of the circle: ");
        double radius = scanner.nextDouble();

        double circumference = calculateCircumference(radius);
        double area = calculateArea(radius);
```

```java
        System.out.println("Circumference of the circle: " + circumference);
        System.out.println("Area of the circle: " + area);

        scanner.close();
    }

    public static double calculateCircumference(double radius) {
        return 2 * 3.1416 * radius;
    }

    public static double calculateArea(double radius) {
        return 3.1416 * radius * radius;
    }
}
```

Output:


```
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Pr
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotsp
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Pr
Enter the radius of the circle: 23
Circumference of the circle: 144.5136
Area of the circle: 1661.9063999999998
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Pr
```

7. Define a method to find out if number is prime or not.

Code:

```java
import java.util.Scanner;

public class Problem7 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a number: ");
        int number = scanner.nextInt();

        if (isPrime(number)) {
            System.out.println(number + " is a prime number.");
        } else {
            System.out.println(number + " is not a prime number.");
        }

        scanner.close();
    }
```

```java
    public static boolean isPrime(int number) {
        if (number <= 1) {
            return false;
        }

        if (number <= 3) {
            return true;
        }

        if (number % 2 == 0 || number % 3 == 0) {
            return false;
        }

        for (int i = 5; i * i <= number; i += 6) {
            if (number % i == 0 || number % (i + 2) == 0) {
                return false;
            }
        }

        return true;
    }
}
```

Output:

```
Local\Programs\Eclipse Adopt
' 'D:\CIS\Semester-4(Fall-20)
Enter a number: 29
29 is a prime number.
PS D:\CIS\Semester-4(Fall-20)
```

8. Write a program which will ask the user to enter his/her marks (out of 100). Define a method that will display grades according to the marks entered as below: Marks Grade 91-100 AA 81-90 AB 71-80 BB 61-70 BC 51-60 CD 41-50 DD <=40 Fail

Code:

```java
import java.util.Scanner;

public class Problem8 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter your marks (out of 100): ");
```

```java
        int marks = scanner.nextInt();

        String grade = calculateGrade(marks);

        System.out.println("Grade: " + grade);

        scanner.close();
    }

    public static String calculateGrade(int marks) {
        if (marks >= 91 && marks <= 100) {
            return "AA";
        } else if (marks >= 81 && marks <= 90) {
            return "AB";
        } else if (marks >= 71 && marks <= 80) {
            return "BB";
        } else if (marks >= 61 && marks <= 70) {
            return "BC";
        } else if (marks >= 51 && marks <= 60) {
            return "CD";
        } else if (marks >= 41 && marks <= 50) {
            return "DD";
        } else {
            return "Fail";
        }
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.
' 'D:\CIS\Semester-4(Fall-2023)\Object Orie
Enter your marks (out of 100): 99
Grade: AA
PS D:\CIS\Semester-4(Fall-2023)\Object Orie
```

9. Write a program to print the factorial of a number by defining a method named 'Factorial'. Factorial of any number n is represented by n! and is equal to 1*2*3*....*(n-1)*n. E.g.- 4! = 1*2*3*4 = 24 3! = 3*2*1 = 6 2! = 2*1 = 2 Also, 1! = 1 0! = 0

Code:

```java
import java.util.Scanner;

public class Problem9 {
```

```java
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a non-negative integer: ");
        int n = scanner.nextInt();

        long factorial = calculateFactorial(n);

        System.out.println(n + "! = " + factorial);

        scanner.close();
    }

    public static long calculateFactorial(int n) {
        if (n < 0) {
            System.out.println("Factorial is not defined for negative
numbers.");
            return -1;
        } else if (n == 0 || n == 1) {
            return 1;
        } else {
            long result = 1;
            for (int i = 2; i <= n; i++) {
                result *= i;
            }
            return result;
        }
    }
}
```

Output:

```
   Local\Programs\Eclipse Adoptium\jdk-
  ' 'D:\CIS\Semester-4(Fall-2023)\Obje
  Enter a non-negative integer: 3
  3! = 6
  PS D:\CIS\Semester-4(Fall-2023)\Obje
```

Level 8: Java Array

1. Take 10 integer inputs from user and store them in an array and print them on screen.

Code:

```java
import java.util.Scanner;

public class Problem1 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        int[] numbers = new int[10];

        System.out.println("Enter 10 integers:");

        for (int i = 0; i < 10; i++) {
            System.out.print("Enter number " + (i + 1) + ": ");
            numbers[i] = scanner.nextInt();
        }

        System.out.println("Entered numbers:");

        for (int i = 0; i < 10; i++) {
            System.out.println("Number " + (i + 1) + ": " + numbers[i]);
        }

        scanner.close();
    }
}
```

Output:

```
ams\Eclipse Adoptium\jdk-17.0.8.7-hotsp
all-2023)\Object Oriented Programming\l
Enter 10 integers:
Enter number 1: 1
Enter number 2: 2
Enter number 3: 3
Enter number 4:
4
Enter number 5: 5
Enter number 6:
6
Enter number 7: 78
Enter number 8: 9
Enter number 9: 0
Enter number 10: 8
Entered numbers:
Number 1: 1
Number 2: 2
Number 3: 3
Number 4: 4
Number 5: 5
Number 6: 6
Number 7: 78
Number 8: 9
Number 9: 0
Number 10: 8
PS D:\CIS\Semester-4(Fall-2023)\Object
```

2. Take 10 integer inputs from user and store them in an array. Again ask user to give a number. Now, tell user whether that number is present in array or not.

Code:

```java
import java.util.Scanner;

public class Problem2 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        int[] numbers = new int[10];
        System.out.println("Enter 10 integers:");

        for (int i = 0; i < 10; i++) {
            System.out.print("Enter number " + (i + 1) + ": ");
            numbers[i] = scanner.nextInt();
        }

        System.out.print("Enter a number to check: ");
        int numberToCheck = scanner.nextInt();

        boolean found = false;

        for (int i = 0; i < 10; i++) {
            if (numbers[i] == numberToCheck) {
                found = true;
                break;
            }
        }

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

        scanner.close();
    }
}
```

Output:

```
3    Enter 10 integers:
     Enter number 1: 1
     Enter number 2: 2
     Enter number 3: 3
     Enter number 4: 4
     Enter number 5: 5
     Enter number 6: 6
     Enter number 7: 7
     Enter number 8: 8
     Enter number 9: 9
     Enter number 10: 0
     Enter a number to check: 3
     3 is present in the array.
     PS D:\CIS\Semester-4(Fall-2023)\Obje
```

3. Take 20 integer inputs from user and print the following: number of positive numbers number of negative numbers number of odd numbers number of even numbers number of 0s.

Code:

```java
import java.util.Scanner;

public class Problem3 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        int[] numbers = new int[20];

        System.out.println("Enter 20 integers:");

        for (int i = 0; i < 20; i++) {
            System.out.print("Enter number " + (i + 1) + ": ");
            numbers[i] = scanner.nextInt();
        }

        int positiveCount = 0;
        int negativeCount = 0;
        int oddCount = 0;
        int evenCount = 0;
        int zeroCount = 0;

        for (int i = 0; i < 20; i++) {
            if (numbers[i] > 0) {
                positiveCount++;
            } else if (numbers[i] < 0) {
                negativeCount++;
            }

            if (numbers[i] % 2 != 0) {
                oddCount++;
```

```
            } else {
                evenCount++;
            }

            if (numbers[i] == 0) {
                zeroCount++;
            }
        }

        System.out.println("Number of positive numbers: " + positiveCount);
        System.out.println("Number of negative numbers: " + negativeCount);
        System.out.println("Number of odd numbers: " + oddCount);
        System.out.println("Number of even numbers: " + evenCount);
        System.out.println("Number of zeros: " + zeroCount);

        scanner.close();
    }
}
```

Output:

```
Enter number 18: 8
Enter number 19: 9
Enter number 20: 9
Number of positive numbers: 19
Number of negative numbers: 0
Number of odd numbers: 11
Number of even numbers: 9
Number of zeros: 1
PS D:\CIS\Semester-4(Fall-2023)\Object
```
tabnine starter

4. Take 10 integer inputs from user and store them in an array. Now, copy all the elements in an another array but in reverse order

Code:

```
import java.util.Scanner;

public class Problem4 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        int[] originalArray = new int[10];

        System.out.println("Enter 10 integers:");

        for (int i = 0; i < 10; i++) {
            System.out.print("Enter number " + (i + 1) + ": ");
```

```java
                originalArray[i] = scanner.nextInt();
        }

        int[] reversedArray = new int[10];

        for (int i = 0; i < 10; i++) {
            reversedArray[i] = originalArray[9 - i];
        }

        System.out.println("Original Array:");
        printArray(originalArray);

        System.out.println("Reversed Array:");
        printArray(reversedArray);

        scanner.close();
    }

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

Output:

```
Enter number 6: 6
Enter number 7: 7
Enter number 8: 8
Enter number 9: 9
Enter number 10: 0
Original Array:
1 2 3 4 5 6 7 8 9 0
Reversed Array:
0 9 8 7 6 5 4 3 2 1
PS D:\CIS\Semester-4(Fall-2023)\O
```

5. Write a program to find the sum and product of all elements of an array.

Code:

```java
import java.util.Scanner;

public class Problem5 {
```

```java
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the size of the array: ");
        int size = scanner.nextInt();

        int[] array = new int[size];

        System.out.println("Enter " + size + " integers:");

        for (int i = 0; i < size; i++) {
            System.out.print("Enter number " + (i + 1) + ": ");
            array[i] = scanner.nextInt();
        }

        int sum = calculateSum(array);
        long product = calculateProduct(array);

        System.out.println("Sum of all elements: " + sum);
        System.out.println("Product of all elements: " + product);

        scanner.close();
    }

    public static int calculateSum(int[] arr) {
        int sum = 0;
        for (int num : arr) {
            sum += num;
        }
        return sum;
    }

    public static long calculateProduct(int[] arr) {
        long product = 1;
        for (int num : arr) {
            product *= num;
        }
        return product;
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.
' 'D:\CIS\Semester-4(Fall-2023)\Object Ori
Enter the size of the array: 5
Enter 5 integers:
Enter number 1: 1
Enter number 2: 2
Enter number 3: 3
Enter number 4: 4
Enter number 5: 5
Sum of all elements: 15
Product of all elements: 120
PS D:\CIS\Semester-4(Fall-2023)\Object Ori
```

6. Initialize and print all elements of a 2D array.

Code:

```java
public class Problem6 {
    public static void main(String[] args) {

        int[][] array2D = {
            {1, 2, 3},
            {4, 5, 6},
            {7, 8, 9}
        };


        System.out.println("Elements of the 2D array:");
        for (int i = 0; i < array2D.length; i++) {
            for (int j = 0; j < array2D[i].length; j++) {
                System.out.print(array2D[i][j] + " ");
            }
            System.out.println();
        }
    }
}
```

Output:

```
Local\Programs\Eclipse Adopti
' 'D:\CIS\Semester-4(Fall-2023
Elements of the 2D array:
1 2 3
4 5 6
7 8 9
PS D:\CIS\Semester-4(Fall-2023
```

7. Find largest and smallest elements of an array.

Code:

```java
public class Problem7 {
    public static void main(String[] args) {
        int[] arr = { 5, 12, 7, 2, 8, 15, 1, 6 };

        int smallest = arr[0];
        int largest = arr[0];

        for (int i = 1; i < arr.length; i++) {
            if (arr[i] < smallest) {
                smallest = arr[i];
            } else if (arr[i] > largest) {
                largest = arr[i];
            }
        }

        System.out.println("Smallest element: " + smallest);
        System.out.println("Largest element: " + largest);
    }
}
```

Output:

```
Local\Programs\Eclipse Adop
' 'D:\CIS\Semester-4(Fall-2
Smallest element: 1
Largest element: 15
PS D:\CIS\Semester-4(Fall-2
```

8. Write a program to check if elements of an array are same or not it read from front or back

Code:

```java
public class Problem8 {
    public static void main(String[] args) {
        int[] arr = {1, 2, 3, 4, 3, 2, 1};

        boolean isPalindrome = checkPalindrome(arr);

        if (isPalindrome) {
            System.out.println("The array is a palindrome.");
        } else {
            System.out.println("The array is not a palindrome.");
        }
    }
}
```

```
        }

    public static boolean checkPalindrome(int[] arr) {
        int start = 0;
        int end = arr.length - 1;

        while (start < end) {
            if (arr[start] != arr[end]) {
                return false;
            }
            start++;
            end--;
        }

        return true;
    }
}
```

Output:

```
' 'D:\CIS\Semester-4(Fall-2023)
The array is a palindrome.
PS D:\CIS\Semester-4(Fall-2023)
```

9. Take an array of 10 elements. Split it into middle and store the elements in two dfferent arrays

Code:

```
public class Problem9 {
    public static void main(String[] args) {
        int[] initialArray = {58, 24, 13, 15, 63, 9, 8, 81, 1, 78};
        int length = initialArray.length;

        int middle = length / 2;

        int[] firstArray = new int[middle];
        int[] secondArray = new int[length - middle];

        for (int i = 0; i < middle; i++) {
            firstArray[i] = initialArray[i];
        }

        for (int i = middle; i < length; i++) {
            secondArray[i - middle] = initialArray[i];
```

```java
        }

        System.out.println("INITIAL array:");
        printArray(initialArray);

        System.out.println("After splitting:");

        System.out.print("First Array: ");
        printArray(firstArray);

        System.out.print("Second Array: ");
        printArray(secondArray);
    }

    public static void printArray(int[] arr) {
        for (int num : arr) {
            System.out.print(num + " ");
        }
        System.out.println();
    }
}
```

Output:

```
        Local\Programs\Eclipse Adoptium\jdk-
        ' 'D:\CIS\Semester-4(Fall-2023)\Obje
        INITIAL array:
        58 24 13 15 63 9 8 81 1 78
        After splitting:
        First Array: 58 24 13 15 63
        Second Array: 9 8 81 1 78
        PS D:\CIS\Semester-4(Fall-2023)\Obje
```

10. Consider an integer array, the number of elements in which is determined by the user. The elements are also taken as input from the user. Write a program to find those pair of elements that has the maximum and minimum difference among all element pairs.

Code:

```java
import java.util.Scanner;

public class Problem10 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the number of elements in the array: ");
        int n = scanner.nextInt();
```

```java
        if (n <= 1) {
            System.out.println("At least two elements are required for
comparisons.");
            return;
        }

        int[] array = new int[n];

        System.out.println("Enter " + n + " integers:");

        for (int i = 0; i < n; i++) {
            System.out.print("Enter element " + (i + 1) + ": ");
            array[i] = scanner.nextInt();
        }

        int maxDifference = Integer.MIN_VALUE;
        int minDifference = Integer.MAX_VALUE;
        int maxDiffPair1 = 0, maxDiffPair2 = 0;
        int minDiffPair1 = 0, minDiffPair2 = 0;

        for (int i = 0; i < n - 1; i++) {
            for (int j = i + 1; j < n; j++) {
                int diff = Math.abs(array[i] - array[j]);

                if (diff > maxDifference) {
                    maxDifference = diff;
                    maxDiffPair1 = array[i];
                    maxDiffPair2 = array[j];
                }

                if (diff < minDifference) {
                    minDifference = diff;
                    minDiffPair1 = array[i];
                    minDiffPair2 = array[j];
                }
            }
        }

        System.out.println("Pair with maximum difference: " + maxDiffPair1 + "
and " + maxDiffPair2);
        System.out.println("Maximum difference: " + maxDifference);
        System.out.println("Pair with minimum difference: " + minDiffPair1 + "
and " + minDiffPair2);
        System.out.println("Minimum difference: " + minDifference);

        scanner.close();
    }
}
```

Output:

```
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Program
Enter the number of elements in the array: 5
Enter 5 integers:
Enter element 1: 1
Enter element 2: 2
Enter element 3: 3
Enter element 4: 4
Enter element 5: 5
Pair with maximum difference: 1 and 5
Maximum difference: 4
Pair with minimum difference: 1 and 2
Minimum difference: 1
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Program
abpine starter                                        Ln 55
```

11. If the input array is [10, 12, 20, 30, 25, 40, 32, 31, 35, 50, 60], your program should be able to find that the subarray lies between the indexes 3 and 8.

Code:

```java
import java.util.Scanner;
public class Problem11 {

public class MaxMinDifferenceSubarray {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the number of elements in the array: ");
        int n = scanner.nextInt();

        if (n <= 1) {
            System.out.println("At least two elements are required for
comparisons.");
            return;
        }

        int[] array = new int[n];

        System.out.println("Enter " + n + " integers:");

        for (int i = 0; i < n; i++) {
            System.out.print("Enter element " + (i + 1) + ": ");
            array[i] = scanner.nextInt();
        }

        int maxDifference = Integer.MIN_VALUE;
        int minDifference = Integer.MAX_VALUE;
        int maxDiffStart = 0, maxDiffEnd = 0;
        int minDiffStart = 0, minDiffEnd = 0;

        for (int i = 0; i < n - 1; i++) {
```

```java
        for (int j = i + 1; j < n; j++) {
            int diff = Math.abs(array[i] - array[j]);

            if (diff > maxDifference) {
                maxDifference = diff;
                maxDiffStart = i;
                maxDiffEnd = j;
            }

            if (diff < minDifference) {
                minDifference = diff;
                minDiffStart = i;
                minDiffEnd = j;
            }
        }
    }

    System.out.println("Subarray with maximum difference:");
    printSubarray(array, maxDiffStart, maxDiffEnd);

    System.out.println("Maximum difference: " + maxDifference);

    System.out.println("Subarray with minimum difference:");
    printSubarray(array, minDiffStart, minDiffEnd);

    System.out.println("Minimum difference: " + minDifference);

    scanner.close();
}

public static void printSubarray(int[] arr, int start, int end) {
    for (int i = start; i <= end; i++) {
        System.out.print(arr[i] + " ");
    }
    System.out.println();
}
}

}
```

Output:

```
   'D:\CIS\Semester-4(Fall-2023)\Object Orient
Enter the number of elements in the array: 4
Enter 4 integers:
Enter element 1: 3
Enter element 2: 4
Enter element 3: 1
Enter element 4: 5
Subarray with maximum difference:
1 5
Maximum difference: 4
Subarray with minimum difference:
3 4
Minimum difference: 1
PS D:\CIS\Semester-4(Fall-2023)\Object Orient
```

Level 9: Characters and Strings

1. Write a program to print a string entered by user

Code:

```java
import java.util.Scanner;

public class Problem1 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a string: ");
        String inputString = scanner.nextLine();

        System.out.println("You entered: " + inputString);

        scanner.close();
    }
}
```

Output:

```
ages' '-cp' 'D:\CIS\Semester-4(Fall-20
1'
Enter a string: sajit
You entered: sajit
PS D:\CIS\Semester-4(Fall-2023)\Object
```

2. Write a program to input and display the sentence I love candies

Code:

```java
import java.util.Scanner;

public class Problem2 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a sentence: ");
        String sentence = scanner.nextLine();

        System.out.println("You entered: " + sentence);

        scanner.close();
    }
}
```

Output:

```
    Local\Programs\Eclipse Adoptium\jdk-17.
    ' 'D:\CIS\Semester-4(Fall-2023)\Object
Enter a sentence: hello world
You entered: hello world
PS D:\CIS\Semester-4(Fall-2023)\Object
```

3. Write a program to find the length of the string "refrigerator".

Code:

```java
public class Problem3 {
    public static void main(String[] args) {
        String str = "refrigerator";
        int length = str.length();

        System.out.println("Length of the string \"" + str + "\" is: " +
length);
    }
}
```

Output:

```
' 'D:\CIS\Semester-4(Fall-2023)\Object Orier
Length of the string "refrigerator" is: 12
PS D:\CIS\Semester-4(Fall-2023)\Object Orier
```

4. Write a program to check if the letter 'e' is present in the word 'Umbrella'.

Code:

```java
public class Problem4 {
    public static void main(String[] args) {
        String word = "Umbrella";
        char targetLetter = 'e';
        boolean isPresent = false;

        for (int i = 0; i < word.length(); i++) {
            if (word.charAt(i) == targetLetter) {
                isPresent = true;
                break;
            }
        }
```

```
        if (isPresent) {
            System.out.println("The letter 'e' is present in the word
'Umbrella'.");
        } else {
            System.out.println("The letter 'e' is not present in the word
'Umbrella'.");
        }
    }
}
```

Output:

```
 Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspo
  ' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Pro
  The letter 'e' is present in the word 'Umbrella'.
  PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Pro
```

5. Write a program to check if the word 'orange' is present in the "This is orange juice".

Code:

```java
public class Problem5 {
    public static void main(String[] args) {
        String sentence = "This is orange juice";
        String targetWord = "orange";
        boolean isPresent = false;

        String[] words = sentence.split(" ");

        for (String word : words) {
            if (word.equals(targetWord)) {
                isPresent = true;
                break;
            }
        }

        if (isPresent) {
            System.out.println("The word 'orange' is present in the
sentence.");
        } else {
            System.out.println("The word 'orange' is not present in the
sentence.");
        }
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hots
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented P
The word 'orange' is present in the sentence.
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented P
```

6. Write a program to find the first and the last occurence of the letter 'o' and character ',' in "Hello, World"

Code:

```java
public class Problem6 {
    public static void main(String[] args) {
        String str = "Hello, World";
        char targetChar1 = 'o';
        char targetChar2 = ',';
        int firstOccurrence1 = -1;
        int lastOccurrence1 = -1;
        int firstOccurrence2 = -1;
        int lastOccurrence2 = -1;

        for (int i = 0; i < str.length(); i++) {
            char currentChar = str.charAt(i);

            if (currentChar == targetChar1) {
                if (firstOccurrence1 == -1) {
                    firstOccurrence1 = i;
                }
                lastOccurrence1 = i;
            }

            if (currentChar == targetChar2) {
                if (firstOccurrence2 == -1) {
                    firstOccurrence2 = i;
                }
                lastOccurrence2 = i;
            }
        }

        if (firstOccurrence1 != -1) {
            System.out.println("First occurrence of 'o' is at index: " +
firstOccurrence1);
            System.out.println("Last occurrence of 'o' is at index: " +
lastOccurrence1);
        } else {
            System.out.println("The letter 'o' is not present in the
string.");
```

```
        }

        if (firstOccurrence2 != -1) {
            System.out.println("First occurrence of ',' is at index: " +
firstOccurrence2);
            System.out.println("Last occurrence of ',' is at index: " +
lastOccurrence2);
        } else {
            System.out.println("The character ',' is not present in the
string.");
        }
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-ho
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented
First occurrence of 'o' is at index: 4
Last occurrence of 'o' is at index: 8
First occurrence of ',' is at index: 5
Last occurrence of ',' is at index: 5
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented
```

7. Write a program that takes your full name as input and displays the abbreviations of the first and middle names except the last name which is displayed as it is. For example, if your name is Robert Brett Roser, then the output should be R.B.Roser.

Code:

```java
import java.util.Scanner;

public class Problem7 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter your full name: ");
        String fullName = scanner.nextLine();

        String[] nameParts = fullName.split(" ");
        int nameLength = nameParts.length;

        StringBuilder abbreviatedName = new StringBuilder();

        for (int i = 0; i < nameLength - 1; i++) {
            String namePart = nameParts[i];
            abbreviatedName.append(namePart.charAt(0)).append(".");
```

```
        }

        abbreviatedName.append(nameParts[nameLength - 1]);

        System.out.println("Abbreviated name: " + abbreviatedName.toString());

        scanner.close();
    }
}
```

Output:

```
'  'D:\CIS\Semester-4(Fall-2023)\Object Oriente
Enter your full name: Motiullah Sajit
Abbreviated name: M.Sajit
PS D:\CIS\Semester-4(Fall-2023)\Object Oriente
```

8. Write a program to find the number of vowels, consonents, digits and white space characters in a string.

Code:

```
import java.util.Scanner;

public class Problem8 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a string: ");
        String input = scanner.nextLine().toLowerCase();

        int vowels = 0;
        int consonants = 0;
        int digits = 0;
        int spaces = 0;

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

            if (ch >= 'a' && ch <= 'z') {
                if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' || ch ==
'u') {

                    vowels++;
                } else {
                    consonants++;
                }
```

```
        } else if (ch >= '0' && ch <= '9') {
            digits++;
        } else if (ch == ' ') {
            spaces++;
        }
    }

    System.out.println("Vowels: " + vowels);
    System.out.println("Consonants: " + consonants);
    System.out.println("Digits: " + digits);
    System.out.println("Whitespace characters: " + spaces);

    scanner.close();
    }
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-h
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriente
Enter a string: Hello world
Vowels: 3
Consonants: 7
Digits: 0
Whitespace characters: 1
PS D:\CIS\Semester-4(Fall-2023)\Object Oriente
```

9. Write a program to delete all consonents from the string "Hello, have a good day".

Code:

```
public class Problem9 {
    public static void main(String[] args) {
        String input = "Hello, have a good day";
        String result = removeConsonants(input);

        System.out.println("Original string: " + input);
        System.out.println("String after removing consonants: " + result);
    }

    public static String removeConsonants(String input) {
        StringBuilder result = new StringBuilder();

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

            if (isVowel(ch) || Character.isWhitespace(ch)) {
                result.append(ch);
```

```
        }
    }

    return result.toString();
}

public static boolean isVowel(char ch) {
    ch = Character.toLowerCase(ch);
    return ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' || ch == 'u';
}
}
}
```

Output:

```
Local\Programs\Eclipse Adoptium\jdk-17.0.8.7-hotspot\bin\java
' 'D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\l
Original string: Hello, have a good day
String after removing consonants: eo ae a oo a
PS D:\CIS\Semester-4(Fall-2023)\Object Oriented Programming\l
```

10. Input a string of alphabets. Find out the number of occurrence of all alphabets in that string. Find out the alphabet with maximum occurrence.

Code:

```
import java.util.Scanner;

public class Problem10 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a string of alphabets: ");
        String input = scanner.nextLine().toLowerCase();

        int[] frequency = new int[26];

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

            if (Character.isLetter(ch)) {
                int index = ch - 'a';
                frequency[index]++;
            }
        }

        int maxFrequency = 0;
        char maxAlphabet = ' ';
```

```java
        for (char ch = 'a'; ch <= 'z'; ch++) {
            int index = ch - 'a';
            if (frequency[index] > maxFrequency) {
                maxFrequency = frequency[index];
                maxAlphabet = ch;
            }
        }

        System.out.println("Alphabet frequencies:");
        for (char ch = 'a'; ch <= 'z'; ch++) {
            int index = ch - 'a';
            if (frequency[index] > 0) {
                System.out.println(ch + ": " + frequency[index]);
            }
        }

        System.out.println("Alphabet with maximum occurrence: " + maxAlphabet
+ " (" + maxFrequency + " times)");

        scanner.close();
    }
}
```

Output: