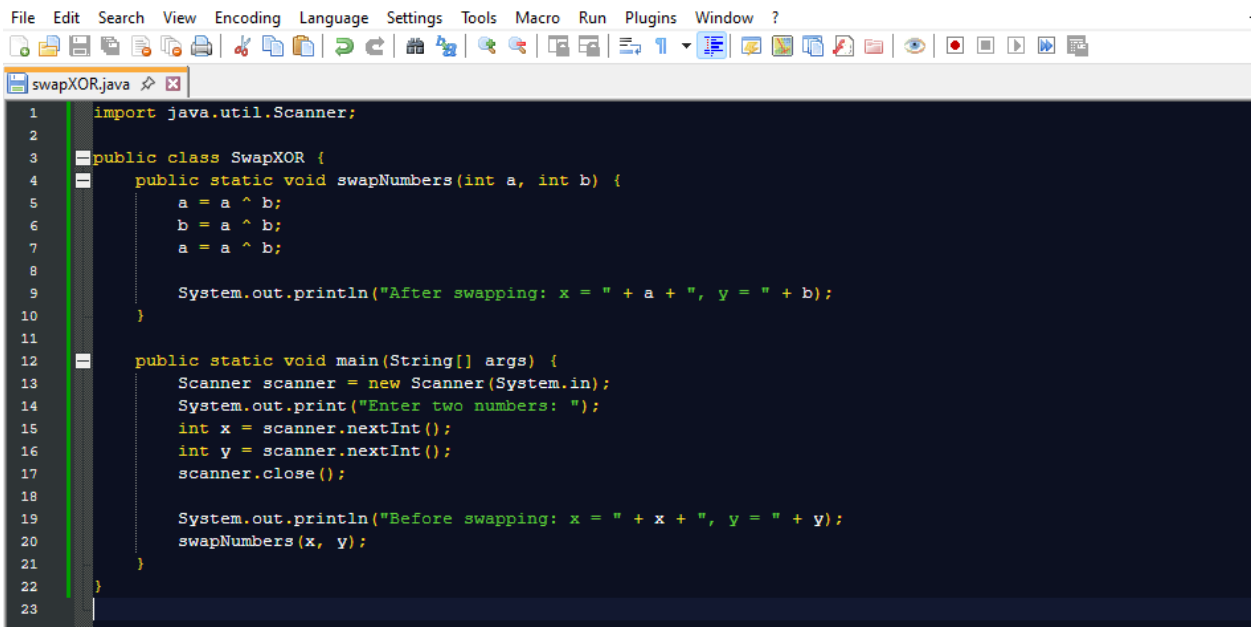
# ASSSIGNMENT-2

1. Arithmetic & Assignment Operators

Q1: Write a program to swap two numbers without using a third variable and without using arithmetic operators like + or - . Hint : Use bitwise XOR ^ operator.

---



```
C:\Windows\system32\cmd.e:
Microsoft Windows [Version 10.0.22621.4317]
(c) Microsoft Corporation. All rights reserved.

C:\Users\waghu\OneDrive\Documents\Java test>javac SwapXOR.java

C:\Users\waghu\OneDrive\Documents\Java test>java SwapXOR
Enter two numbers: 80

50
Before swapping: x = 80, y = 50
After swapping: x = 50, y = 80

C:\Users\waghu\OneDrive\Documents\Java test>
```

Q2: Write a program to check whether a given number is even or odd using only bitwise operators . Hint : Use n & 1 to check.

---

EvenoddBitwise.java

```java
import java.util.Scanner;

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

        if ((n & 1) == 0) {
            System.out.println(n + " is Even");
        } else {
            System.out.println(n + " is Odd");
        }
    }
}
```

```
C:\Windows\system32\cmd.e:

C:\Users\waghu\OneDrive\Documents\Java test>javac EvenOddBitwise.java

C:\Users\waghu\OneDrive\Documents\Java test>java EvenOddBitwise
Enter a number: 50
50 is Even

C:\Users\waghu\OneDrive\Documents\Java test>
```

Q3: Implement a program that calculates the sum of digits of an integer using modulus ( % ) and division ( / ) operators .

---

SumofDigits.java

```java
import java.util.Scanner;

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

        int sum = 0;
        while (n != 0) {
            sum += n % 10;
            n /= 10;
        }

        System.out.println("Sum of digits: " + sum);
    }
}
```

```
C:\Users\waghu\OneDrive\Documents\Java test>javac SumOfDigits.java

C:\Users\waghu\OneDrive\Documents\Java test>java SumOfDigits
Enter a number: 56
Sum of digits: 11

C:\Users\waghu\OneDrive\Documents\Java test>
```

Q4: Write a program to find whether a given number is divisible by 3 without using the modulus ( % ) or division ( / ) operators. Hint : Use subtraction and bitwise shifts.

---

Divisible.java

```java
import java.util.Scanner;

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

        int sum = 0;
        int num = Math.abs(n); // Work with positive numbers

        while (num > 0) {
            sum += num & 1; // Add last bit
            num >>= 1; // Right shift to remove last bit
            sum += num & 1; // Add new last bit
            num >>= 1; // Right shift again
        }

        if (sum == 0 || sum % 3 == 0) {
            System.out.println(n + " is divisible by 3");
        } else {
            System.out.println(n + " is not divisible by 3");
        }
    }
}
```

```
C:\Windows\system32\cmd.e:

C:\Users\waghu\OneDrive\Documents\Java test>javac Divisible.java

C:\Users\waghu\OneDrive\Documents\Java test>java Divisible
Enter a number: 89
89 is not divisible by 3

C:\Users\waghu\OneDrive\Documents\Java test>
```

Q5: Write a Java program to swap two numbers using the += and -= operators only.

---

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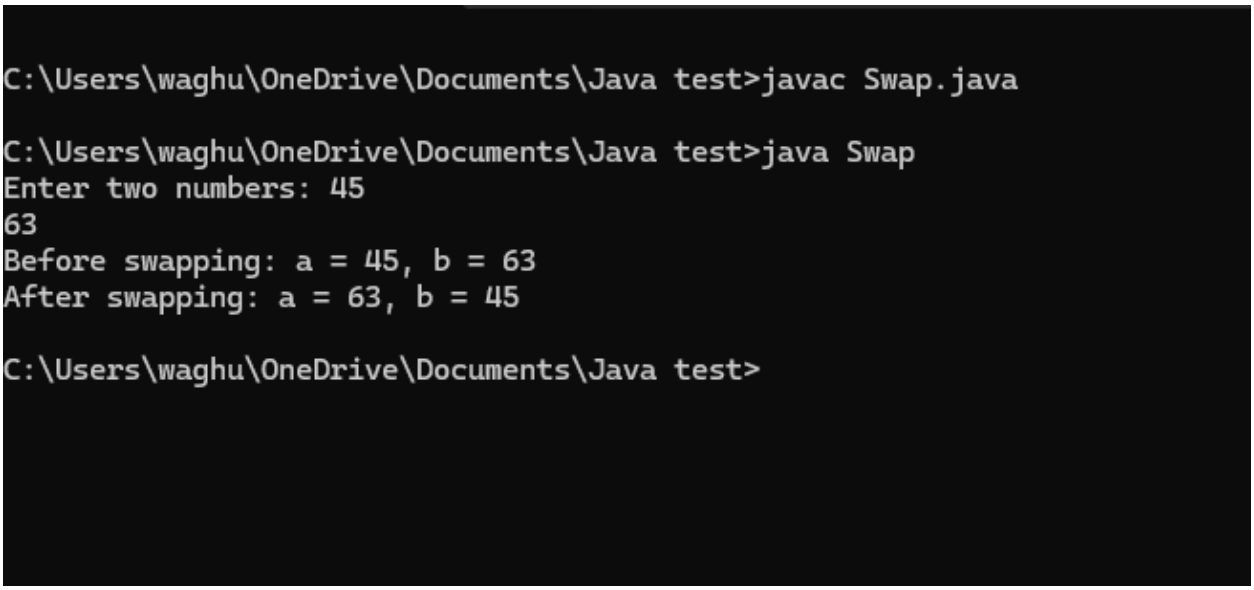
Swap.java

```java
import java.util.Scanner;

public class Swap {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter two numbers: ");
        int a = scanner.nextInt();
        int b = scanner.nextInt();
        scanner.close();

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

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

        System.out.println("After swapping: a = " + a + ", b = " + b);
    }
}
```




## 2. Relational & Logical Operators

Q6: Write a program to find the largest of three numbers using only the ternary operator ( ? : ) .

---

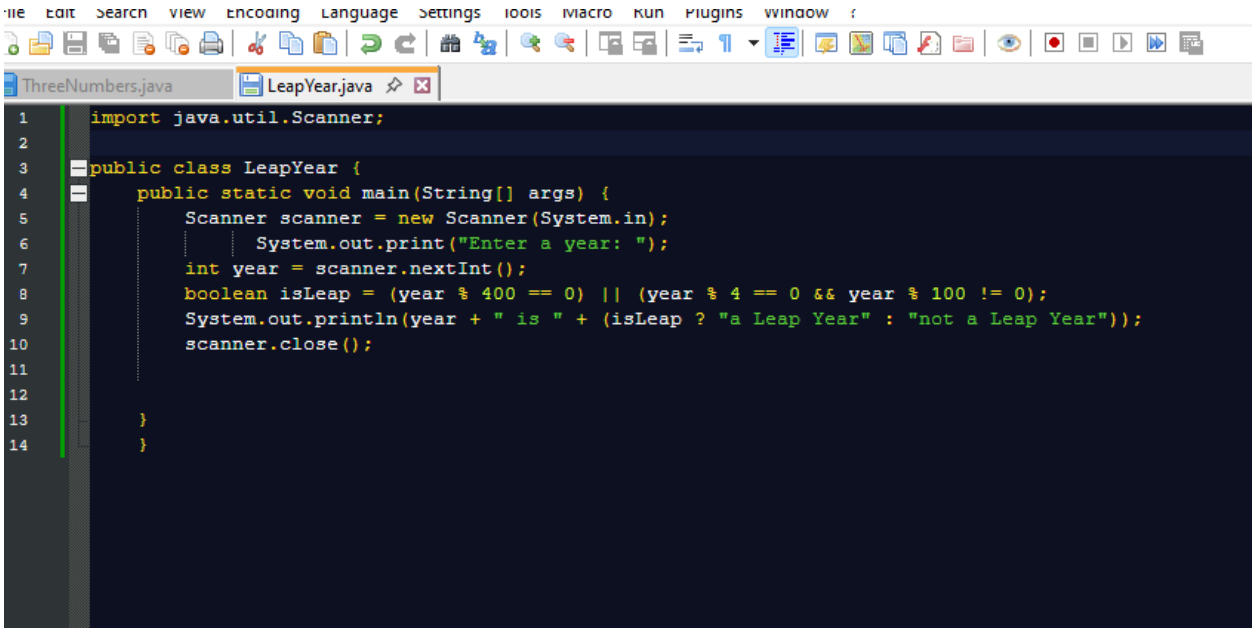
ThreeNumbers.java

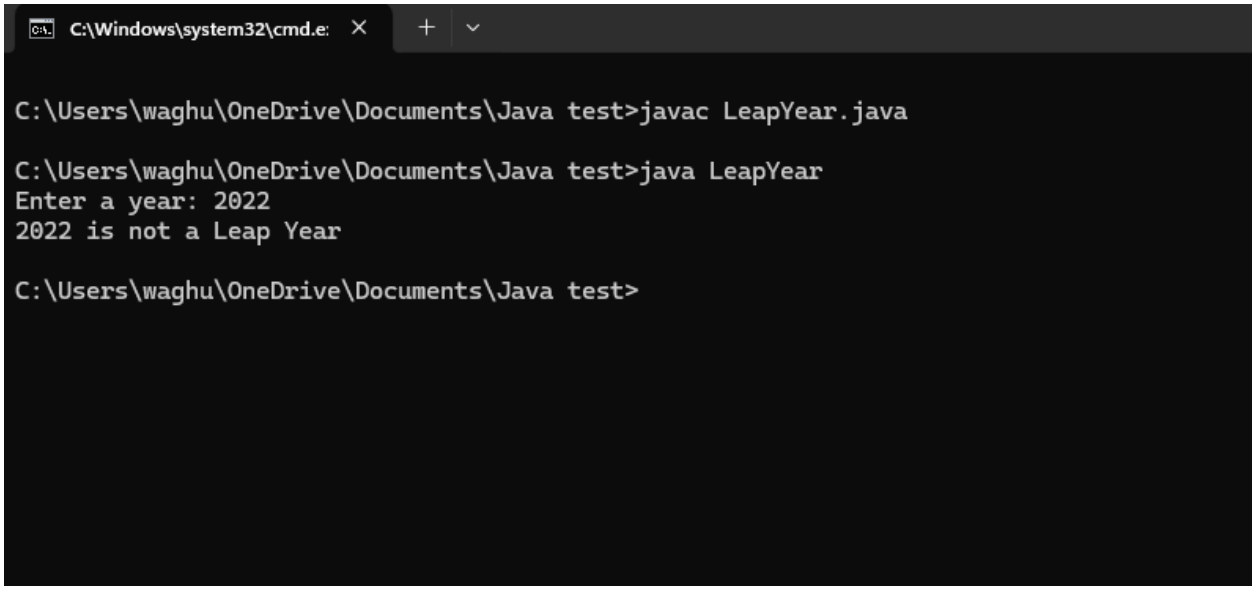
```java
import java.util.Scanner;

public class ThreeNumbers {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
                System.out.print("Enter three numbers: ");
        int x = scanner.nextInt();
        int y = scanner.nextInt();
        int z = scanner.nextInt();
        int largest = (x > y) ? ((x > z) ? x : z) : ((y > z) ? y : z);
        System.out.println("Largest number: " + largest);
        scanner.close();


    }
    }
```

```
C:\Users\waghu\OneDrive\Documents\Java test>javac ThreeNumbers.java

C:\Users\waghu\OneDrive\Documents\Java test>java ThreeNumbers
Enter three numbers: 12 50 78
Largest number: 78

C:\Users\waghu\OneDrive\Documents\Java test>
```

Q7: Implement a Java program that checks whether a given year is a leap year or not using logical ( && , || ) operators .

---




Q8: Write a program that takes three boolean inputs and prints true if at least two of them are true . Hint : Use logical operators ( && , || ).

---

ThreeNumbers.java | LeapYear.java | Boolean.java

```java
import java.util.Scanner;

public class Boolean {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
            System.out.print("Enter three boolean values (true/false): ");
        boolean b1 = scanner.nextBoolean();
        boolean b2 = scanner.nextBoolean();
        boolean b3 = scanner.nextBoolean();
        boolean atLeastTwoTrue = (b1 && b2) || (b1 && b3) || (b2 && b3);
        System.out.println("At least two true: " + atLeastTwoTrue);
        scanner.close();


    }
    }
```

C:\Windows\system32\cmd.e

```
C:\Users\waghu\OneDrive\Documents\Java test>javac Boolean.java

C:\Users\waghu\OneDrive\Documents\Java test>java Boolean
Enter three boolean values (true/false): true false false
At least two true: false

C:\Users\waghu\OneDrive\Documents\Java test>
```

Q9: Implement a Java program that checks if a number is within a specific range (20 to 50) without using if-else . Hint : Use logical AND ( && ) in a print statement

---

Range.java

```java
import java.util.Scanner;

public class Range {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
            System.out.print("Enter a number: ");
        int num = scanner.nextInt();
        System.out.println("Is within range (20 to 50): " + (num >= 20 && num <= 50));

        scanner.close();


    }
    }
```

```
C:\Users\waghu\OneDrive\Documents\Java test>javac Range.java

C:\Users\waghu\OneDrive\Documents\Java test>java Range
Enter a number: 16 60
Is within range (20 to 50): false

C:\Users\waghu\OneDrive\Documents\Java test>
```

. Q10: Write a program to determine if a character is a vowel or a consonant using the ternary operator.

---

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TernaryVowel.java

```java
import java.util.Scanner;

public class TernaryVowel {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
                System.out.print("Enter a character: ");
        char ch = scanner.next().charAt(0);
        String result = ("AEIOUaeiou".indexOf(ch) != -1) ? "Vowel" : "Consonant";
        System.out.println(ch + " is a " + result);
        scanner.close();


    }
    }
```

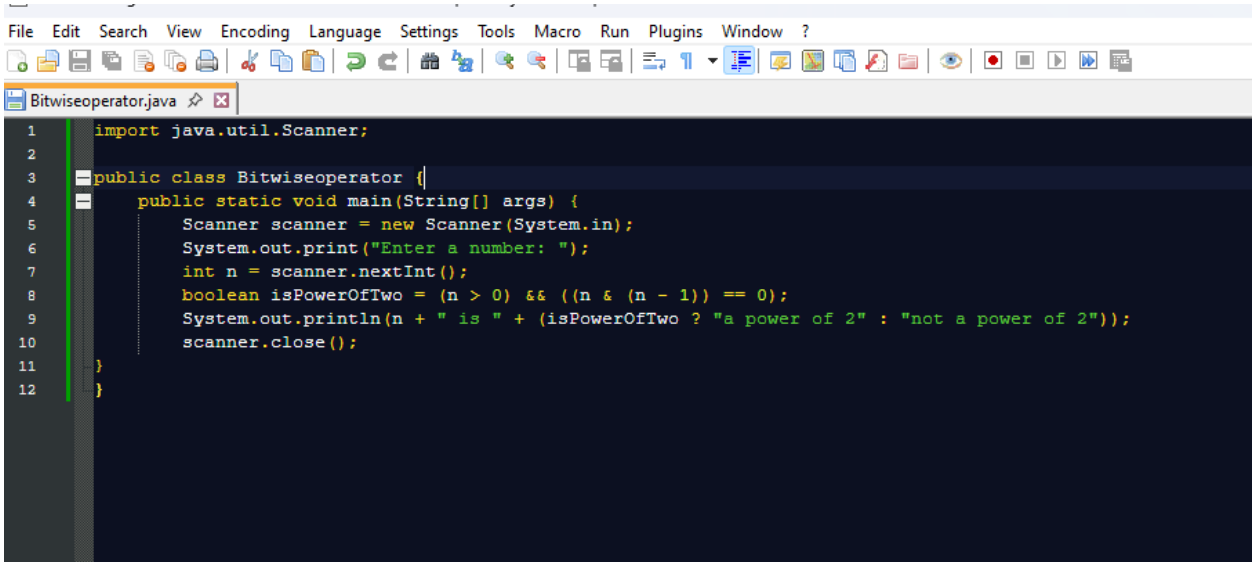
C:\Windows\system32\cmd.e:

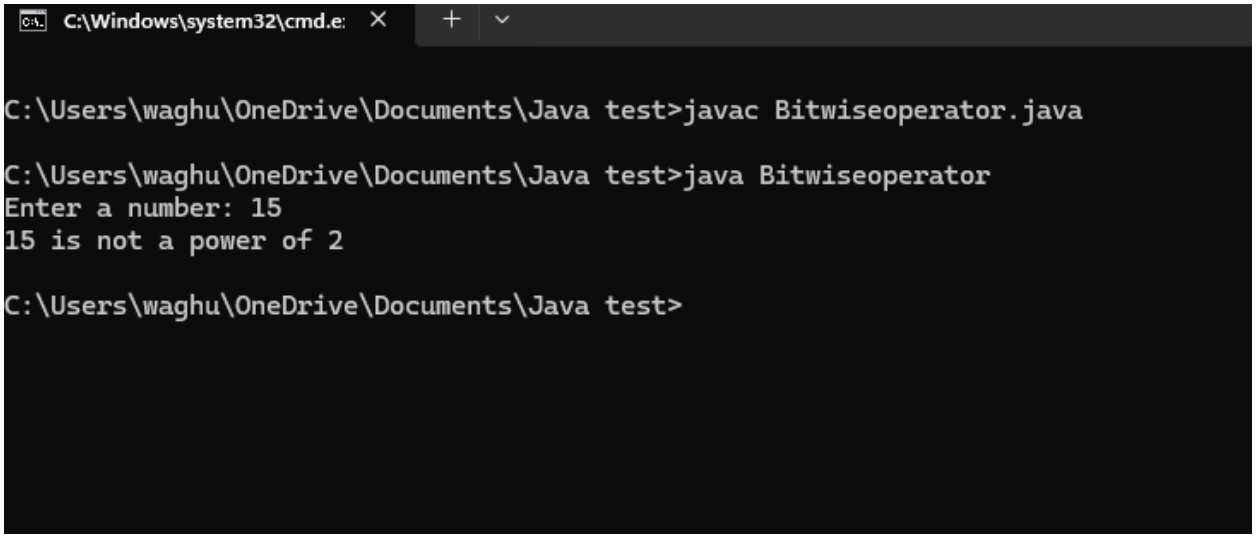
```
C:\Users\waghu\OneDrive\Documents\Java test>javac TernaryVowel.java

C:\Users\waghu\OneDrive\Documents\Java test>java TernaryVowel
Enter a character: k
k is a Consonant

C:\Users\waghu\OneDrive\Documents\Java test>java TernaryVowel
Enter a character: a
a is a Vowel

C:\Users\waghu\OneDrive\Documents\Java test>
```

## 3. Bitwise Operators

Q11: Write a program to check if a given number is a power of 2 using bitwise operators. Hint : n & (n - 1) == 0 for positive numbers.

---




Q12: Write a Java program to multiply a number by 8 without using * or / operators. Hint : Use bitwise left shift ( << ).

---

C:\Users\waghu\OneDrive\Documents\Java test\Multiply.java - Notepad++

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Multiply.java

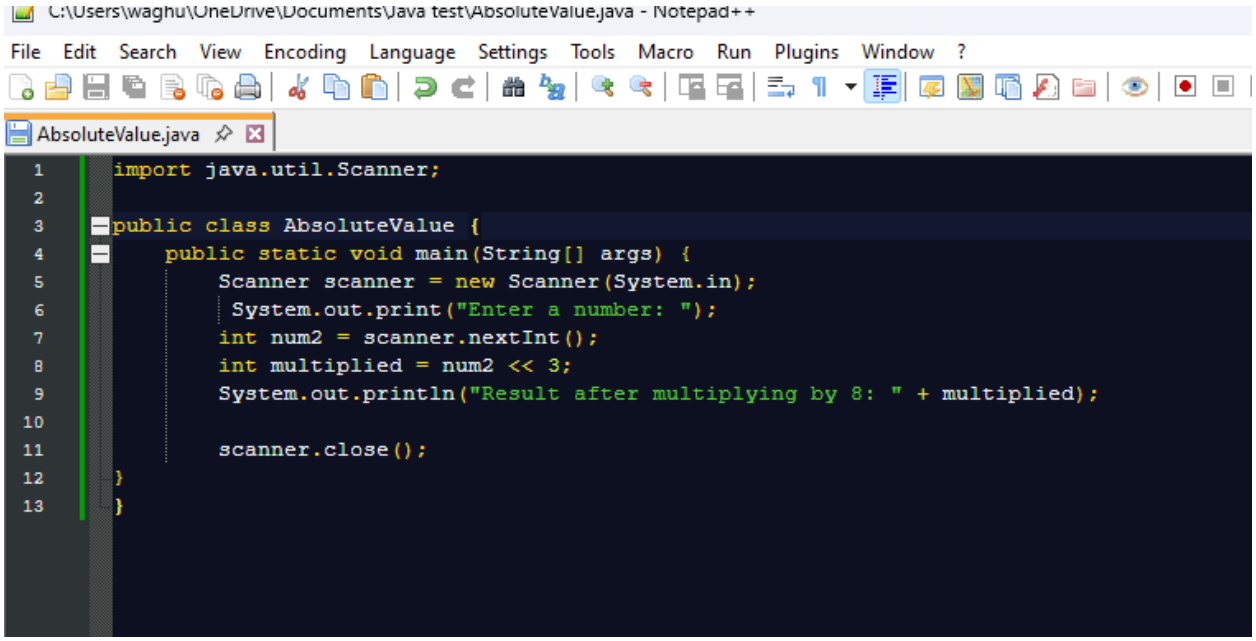
```java
import java.util.Scanner;

public class Multiply {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int num2 = scanner.nextInt();
        int multiplied = num2 << 3;
        System.out.println("Result after multiplying by 8: " + multiplied);

        scanner.close();
}
}
```

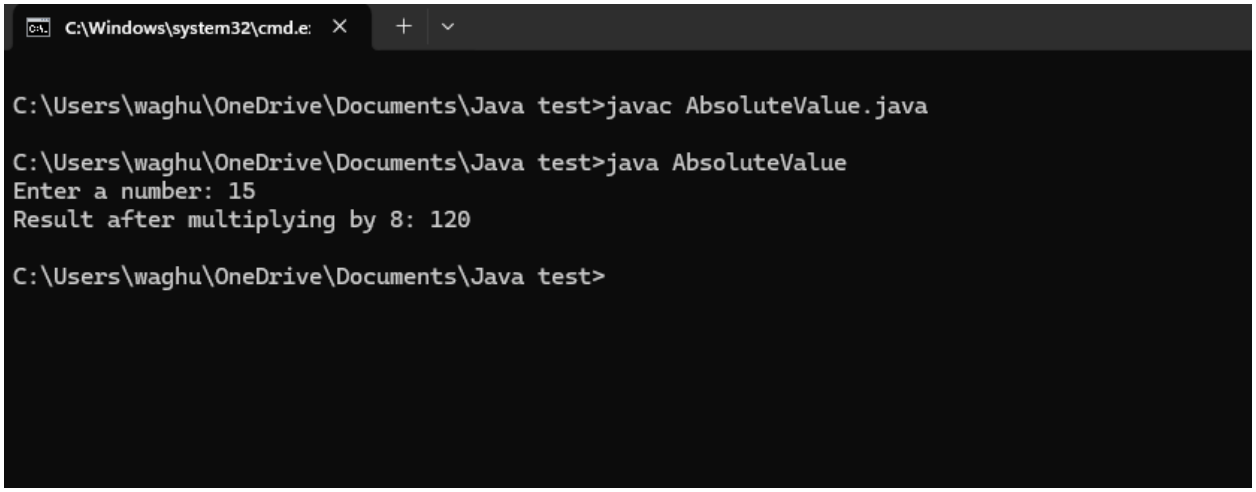
C:\Windows\system32\cmd.e:

```
C:\Users\waghu\OneDrive\Documents\Java test>javac Multiply.java

C:\Users\waghu\OneDrive\Documents\Java test>java Multiply
Enter a number: 69
Result after multiplying by 8: 552

C:\Users\waghu\OneDrive\Documents\Java test>
```

Q13: Implement a Java program to find the absolute value of an integer using bitwise operators. Hint : mask = num >> 31; abs = (num + mask) ^ mask;

---




Q14: Write a program to count the number of 1s (set bits) in a binary representation of a number using bitwise operations. Hint : Use n & (n - 1) .

---

C:\Users\waghu\OneDrive\Documents\Java test\Binary.java - Notepad++

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Binary.java

```java
import java.util.Scanner;

public class Binary {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int num4 = scanner.nextInt();
        int count = 0;
        while (num4 > 0) {
            num4 &= (num4 - 1);
            count++;
        }
        System.out.println("Number of 1s in binary: " + count);

        scanner.close();
}
}
```

C:\Windows\system32\cmd.e:

```
C:\Users\waghu\OneDrive\Documents\Java test>javac Binary.java

C:\Users\waghu\OneDrive\Documents\Java test>java Binary
Enter a number: 56
Number of 1s in binary: 3

C:\Users\waghu\OneDrive\Documents\Java test>
```

Q15: Implement a program to swap odd and even bits of a number using bitwise operators. Hint : Use masks: (x & 0xAAAAAAAA) >> 1 | (x & 0x55555555) << 1

---

C:\Users\waghu\OneDrive\Documents\Java test\Swap1.java - Notepad++

File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?

Swap1.java

```java
import java.util.Scanner;

public class swap1 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int num5 = scanner.nextInt();
        int swappedBits = ((num5 & 0xAAAAAAAA) >> 1) | ((num5 & 0x55555555) << 1);
        System.out.println("Number after swapping odd and even bits: " + swappedBits);

        scanner.close();
}
}
```

C:\Windows\system32\cmd.e:

```
C:\Users\waghu\OneDrive\Documents\Java test>javac swap1.java

C:\Users\waghu\OneDrive\Documents\Java test>java swap1
Enter a number: 58
Number after swapping odd and even bits: 53

C:\Users\waghu\OneDrive\Documents\Java test>
```

## 4. Ternary Operator Challenges

Q16: Write a program that determines whether a given number is positive, negative, or zero using only the ternary operator .

---

C:\Users\waghu\OneDrive\Documents\Java test\PositiveNegative.java - Notepad++

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PositiveNegative.java

```java
import java.util.Scanner;

public class PositiveNegative {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int num = scanner.nextInt();
        String type = (num > 0) ? "Positive" : (num < 0) ? "Negative" : "Zero";
        System.out.println("The number is: " + type);

        scanner.close();
    }
}
```

C:\Windows\system32\cmd.e:

```
C:\Users\waghu\OneDrive\Documents\Java test>java PositiveNegative.java
Enter a number: 50
The number is: Positive

C:\Users\waghu\OneDrive\Documents\Java test>
```

Q17: Implement a Java program that finds the minimum of four numbers using nested ternary operators.

---

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MinofFour.java

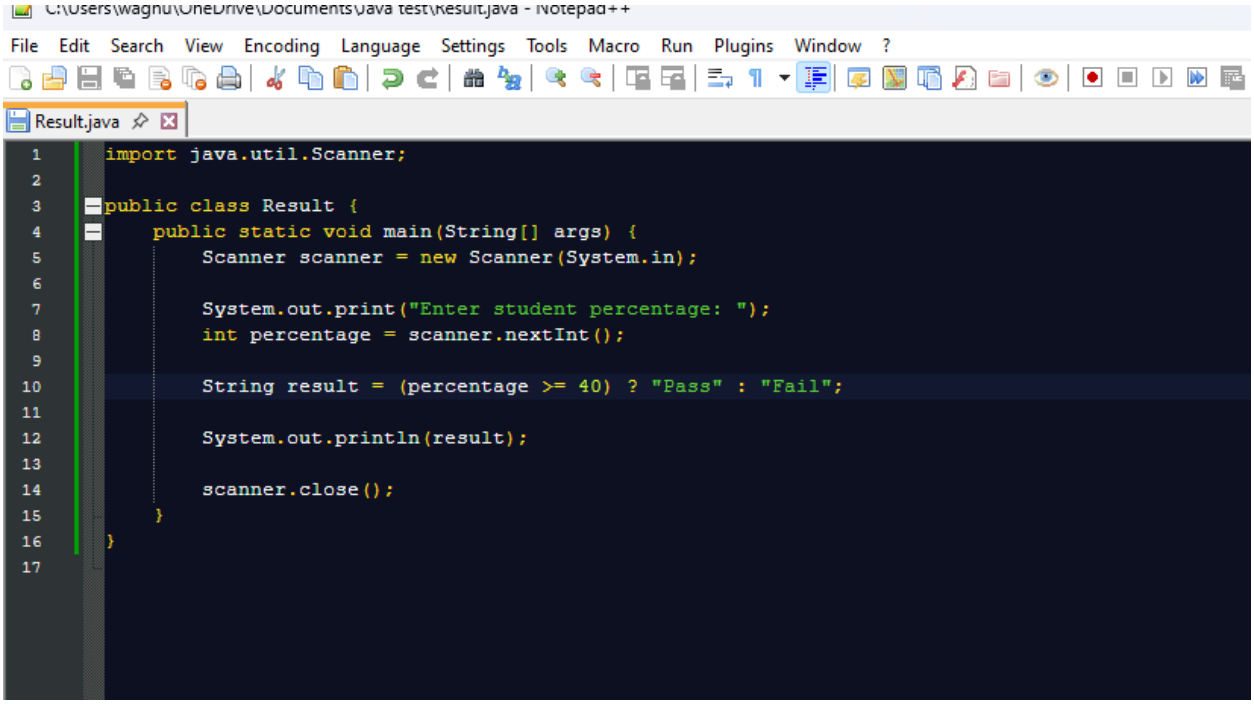
```java
import java.util.Scanner;

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

        System.out.print("Enter four numbers: ");
        int a = scanner.nextInt(), b = scanner.nextInt(), c = scanner.nextInt(), d = scanner.nextInt();

        int min = (a < b) ? (a < c ? (a < d ? a : d) : (c < d ? c : d)) : (b < c ? (b < d ? b : d) : (c < d ? c : d

        System.out.println("Minimum number: " + min);

        scanner.close();
    }
}
```

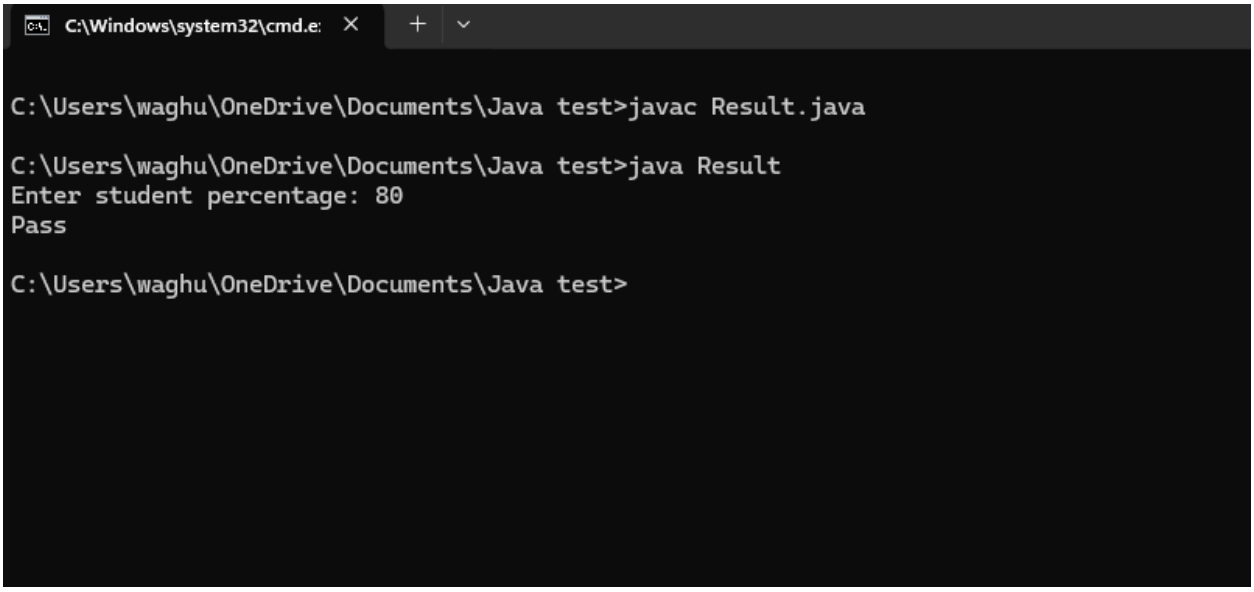
C:\Windows\system32\cmd.e

```
Microsoft Windows [Version 10.0.22621.4317]
(c) Microsoft Corporation. All rights reserved.

C:\Users\waghu\OneDrive\Documents\Java test>javac MinOfFour.java

C:\Users\waghu\OneDrive\Documents\Java test>java MinOfFour
Enter four numbers: 1 8 6 9
Minimum number: 1

C:\Users\waghu\OneDrive\Documents\Java test>
```

Q18: Given a student's percentage, print "Pass" if the percentage is 40 or above; otherwise, print "Fail" , using only the ternary operator.

---




Q19: Write a Java program that checks whether a character is uppercase, lowercase, or not a letter using only the ternary operator.

---

C:\Users\waghu\OneDrive\Documents\Java test\Character.java - Notepad++

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Character.java

```java
import java.util.Scanner;

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

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

        String result = (ch >= 'A' && ch <= 'Z') ? "Uppercase" :
                        (ch >= 'a' && ch <= 'z') ? "Lowercase" : "Not a letter";

        System.out.println(result);

        scanner.close();
    }
}

```

C:\Windows\system32\cmd.e

```
C:\Users\waghu\OneDrive\Documents\Java test>javac Character.java

C:\Users\waghu\OneDrive\Documents\Java test>java Character
Enter a character: cdac
Lowercase

C:\Users\waghu\OneDrive\Documents\Java test>java Character
Enter a character: MUMBAI
Uppercase

C:\Users\waghu\OneDrive\Documents\Java test>
```

Q20: Implement a Java program that returns the absolute value of a given number using the ternary operator (without using Math.abs() ).

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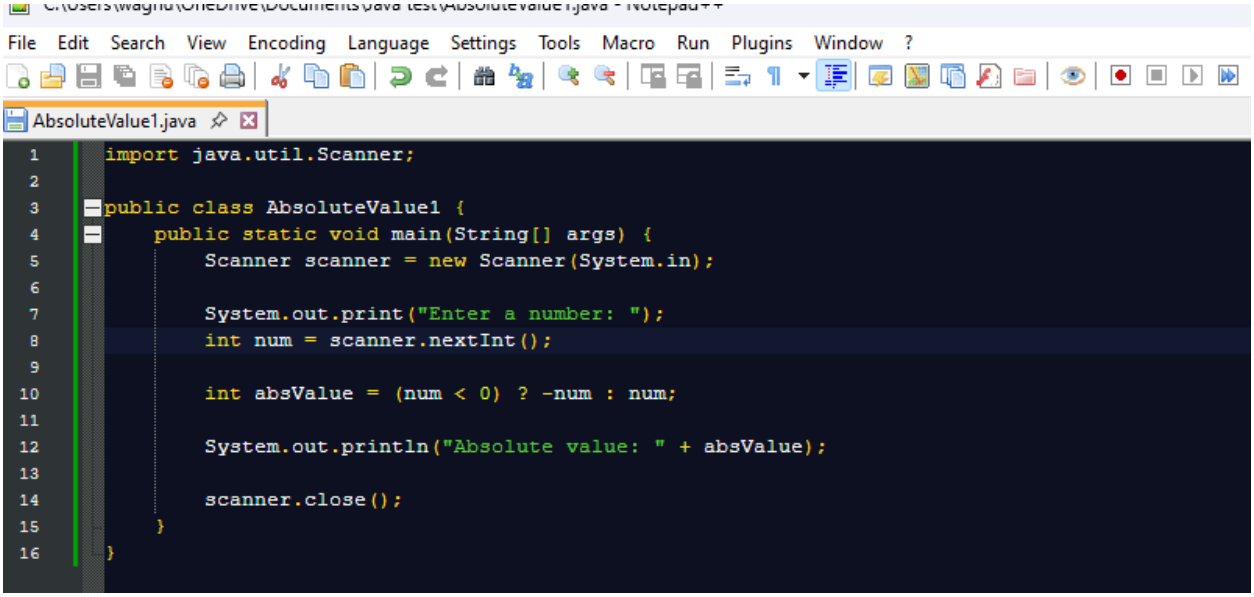
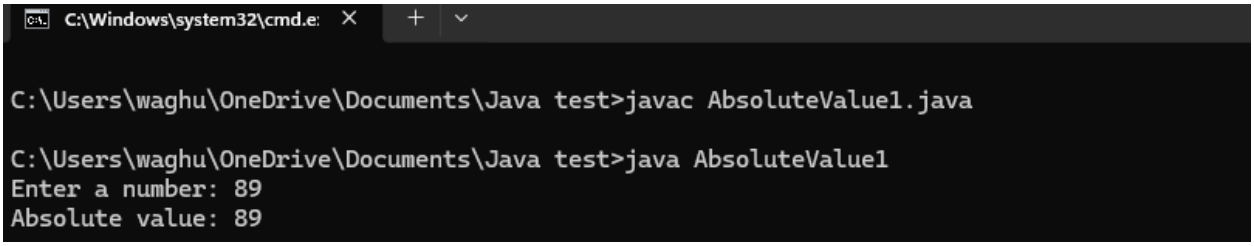
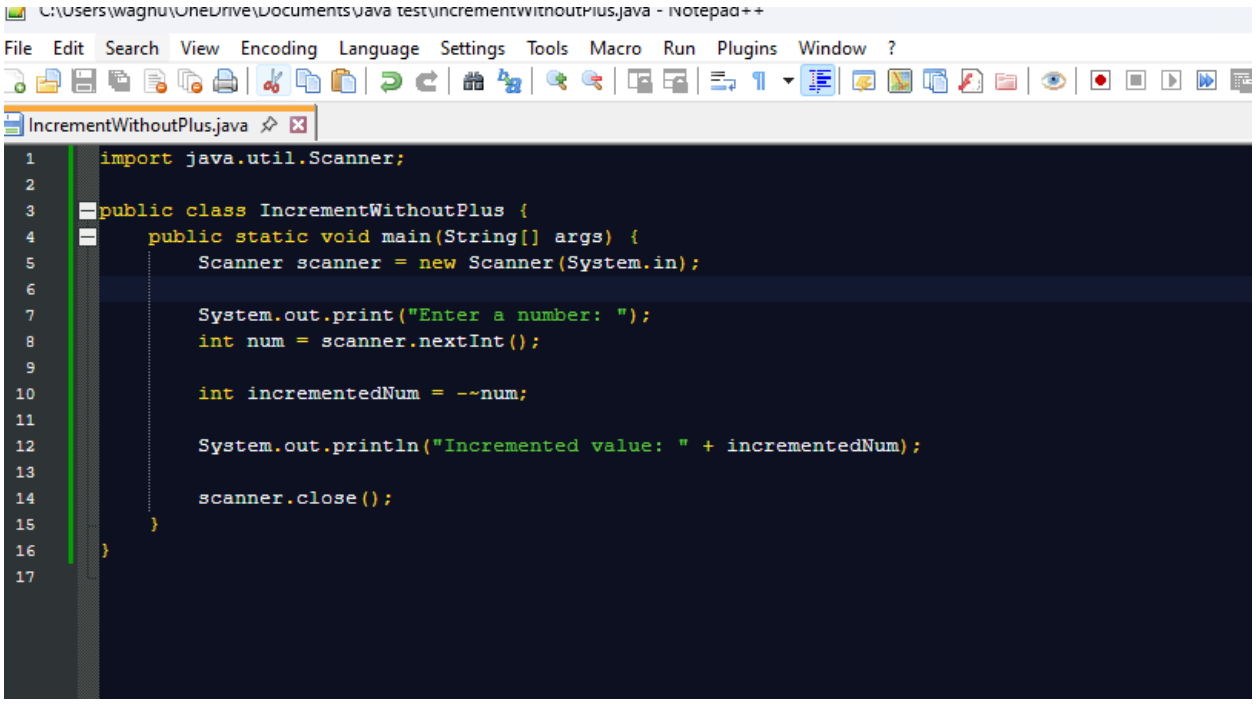


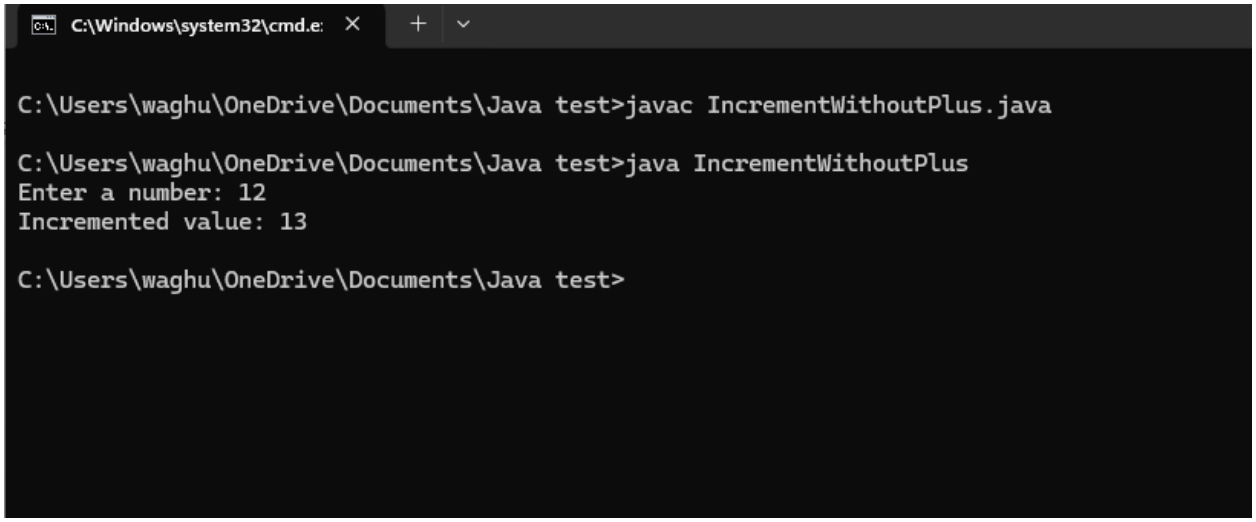




## 5.Miscellaneous Operator Questions

Q21: Write a program that increments a number without using + or ++ operators. Hint : Use bitwise - (~x) .

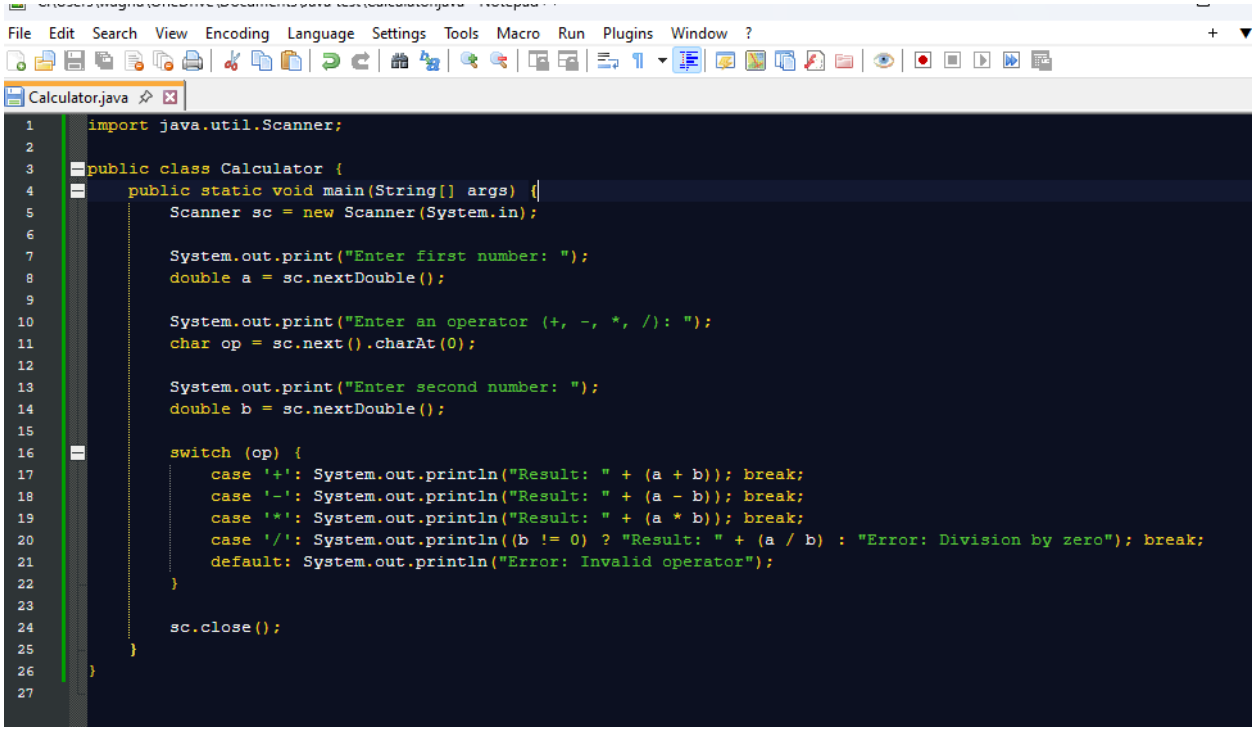
---

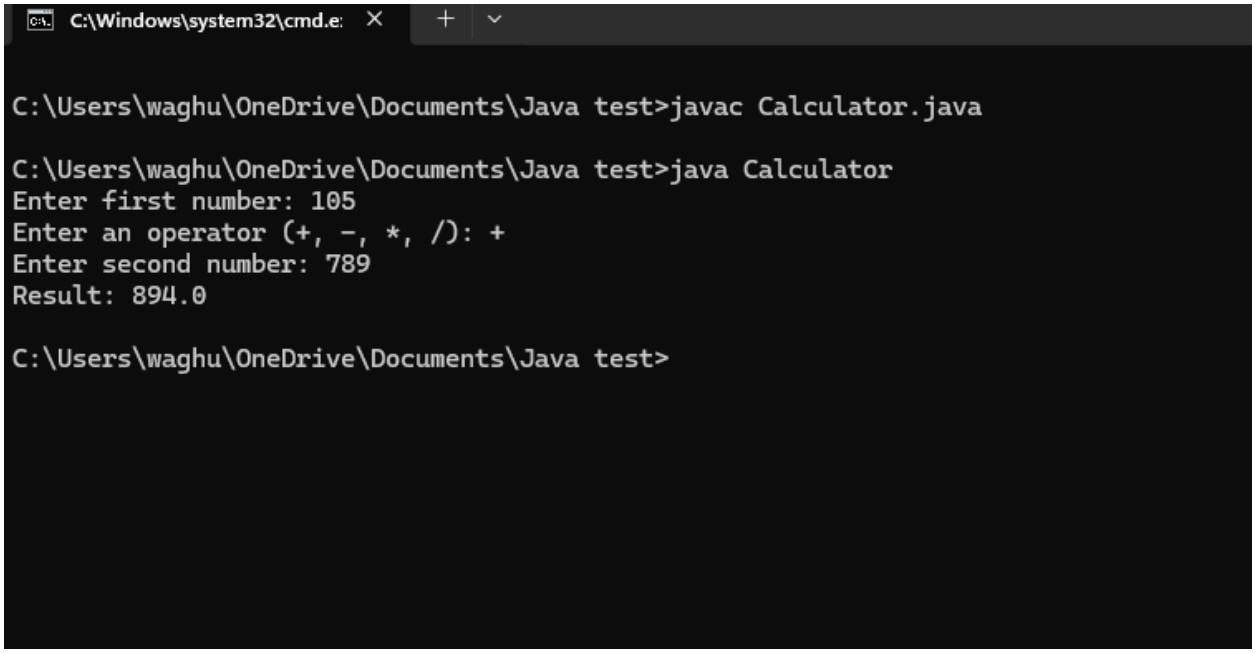



Q22: Implement a calculator that takes two numbers and an operator ( + , - , * , / ) as input and prints the result using only switch-case .

---




Q23: Given a number, find whether it is odd or even using the & bitwise operator and print the result without using if-else .

---

C:\Users\waghu\OneDrive\Documents\Java test\OddEvenCheck.java - Notepad++

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OddEvenCheck.java

```java
import java.util.Scanner;

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

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

        System.out.println((num & 1) == 0 ? "Even" : "Odd");

        scanner.close();
    }
}
```

C:\Windows\system32\cmd.e

```
C:\Users\waghu\OneDrive\Documents\Java test>javac OddEvenCheck.java

C:\Users\waghu\OneDrive\Documents\Java test>java OddEvenCheck
Enter a number: 85
Odd

C:\Users\waghu\OneDrive\Documents\Java test>java OddEvenCheck
Enter a number: 2
Even

C:\Users\waghu\OneDrive\Documents\Java test>
```

Q24: Write a program that prints all even numbers from 1 to 100 using only bitwise AND ( & ) and for loop.

---

C:\Users\waghu\OneDrive\Documents\Java test\EvenNumbers.java - Notepad++

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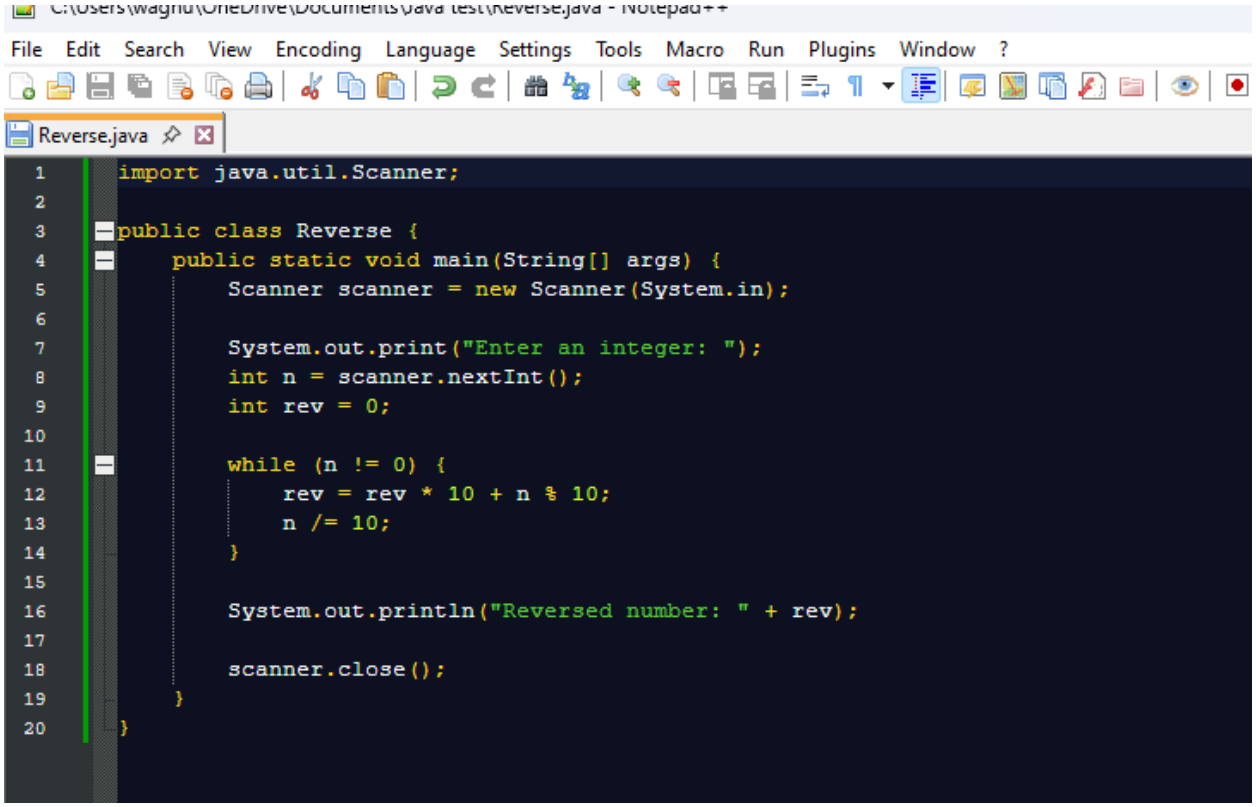
EvenNumbers.java

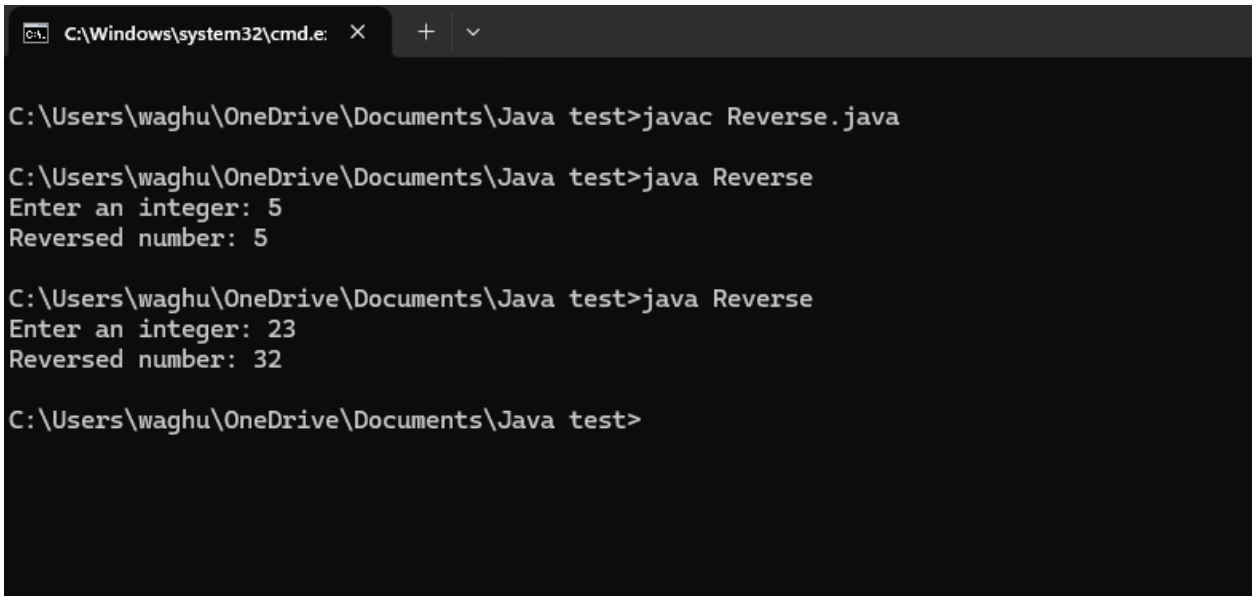
```java
public class EvenNumbers {
    public static void main(String[] args) {
        for (int i = 1; i <= 100; i++) {
            if ((i & 1) == 0) {
                System.out.println(i);
            }
        }
    }
}
```

```
C:\Users\waghu\OneDrive\Documents\Java test>java EvenNumbers
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
62
64
66
68
70
72
74
76
78
80
82
84
86
88
90
92
94
96
98
100
```

Q25: Implement a program that reverses an integer number without using string conversion ( StringBuilder or toCharArray ). Hint : Use while(n!=0) { rev = rev * 10 + n % 10; n /= 10; }

---


File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
Reverse.java
import java.util.Scanner;
public class Reverse {
public static void main(String[] args) {
Scanner scanner = new Scanner(System.in);
System.out.print("Enter an integer: ");
int n = scanner.nextInt();
int rev = 0;
while (n != 0) {
rev = rev * 10 + n % 10;
n /= 10;
}
System.out.println("Reversed number: " + rev);
scanner.close();
}
}


C:\Windows\system32\cmd.e:
C:\Users\waghu\OneDrive\Documents\Java test>javac Reverse.java
C:\Users\waghu\OneDrive\Documents\Java test>java Reverse
Enter an integer: 5
Reversed number: 5
C:\Users\waghu\OneDrive\Documents\Java test>java Reverse
Enter an integer: 23
Reversed number: 32
C:\Users\waghu\OneDrive\Documents\Java test>