

## 1. Arithmetic & Assignment Operators

**Q1:** Write a program to swap two numbers without using a third variable and without using arithmetic operators like + or - .

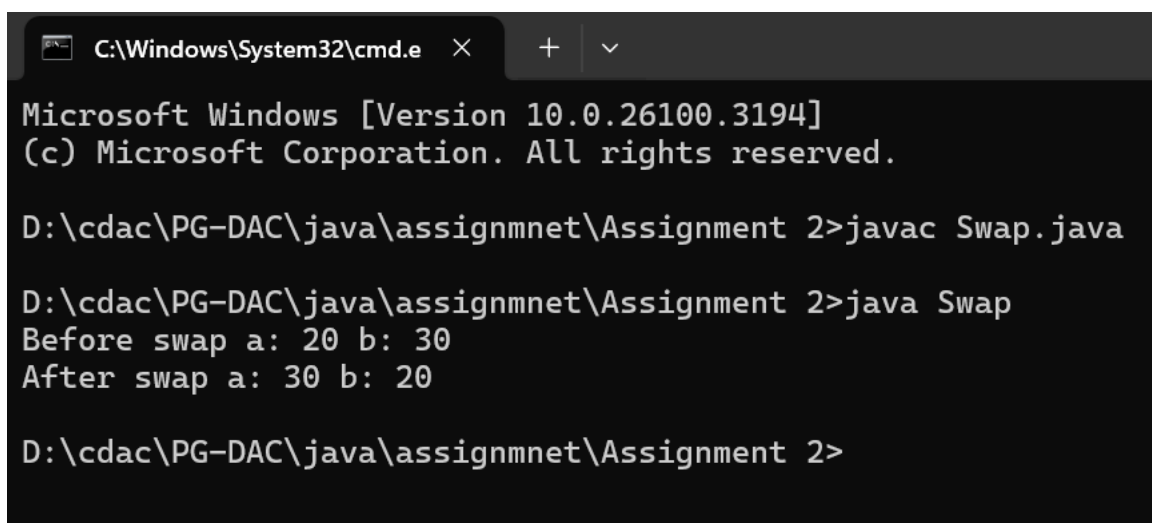
**Hint :** Use bitwise XOR ^ operator.

**Ans:**

**Input:**

```
class Swap{  
    public static void main(String args[]){  
        int a= 20;  
        int b= 30;  
        System.out.println("Before swap a: "+a+" b: "+b);  
        a=a^b;  
        b=b^a;  
        a=a^b;  
        System.out.println("After swap a: "+a+" b: "+b);  
    }  
}
```

**Output:**



```
C:\Windows\System32\cmd.e  ×  +  ∨  
Microsoft Windows [Version 10.0.26100.3194]  
(c) Microsoft Corporation. All rights reserved.  
  
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Swap.java  
  
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Swap  
Before swap a: 20 b: 30  
After swap a: 30 b: 20  
  
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>
```

**Q2:** Write a program to check whether a given number is even or odd using only bitwise operators .

**Hint : Use  $n \& 1$  to check.**

**Ans:**

**Input:**

```
import java.util.Scanner;

class Check{

    public static void main(String args[]){

        Scanner input = new Scanner(System.in);

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

        int n = input.nextInt();

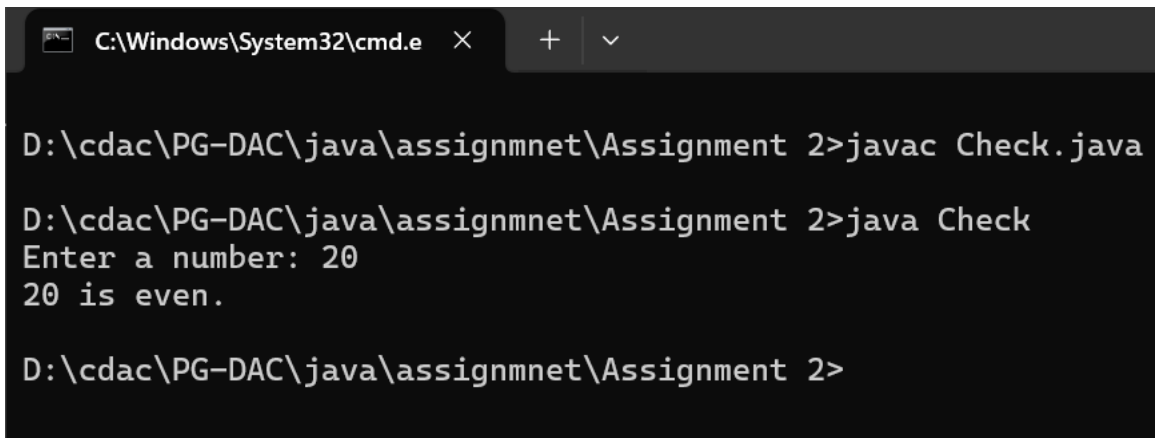
        String result = ((n & 1) == 0) ? n + " is even." : n + " is odd.";

        System.out.println(result);

    }

}
```

**Output:**



```
C:\Windows\System32\cmd.e  X  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Check.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Check
Enter a number: 20
20 is even.

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>
```

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

**Ans:**

**Input:**

```
import java.util.Scanner;

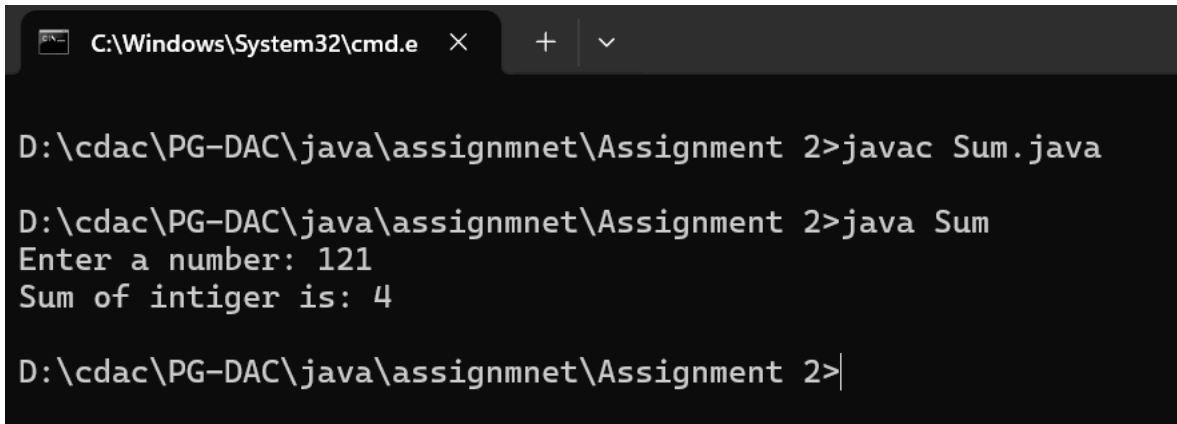
class Sum{
```

```

    public static void main(String args[]){
        Scanner input = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int n = input.nextInt();
        int sum=0;
        while(n!=0)
        {
            int temp= n%10;
            sum = sum + temp;
            n = n/ 10;
        }
        System.out.println("Sum of intiger is: "+ sum);
    }
}

```

**Output:**



```

C:\Windows\System32\cmd.e
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Sum.java
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Sum
Enter a number: 121
Sum of intiger is: 4
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>|

```

**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 .**

**Ans:**

**Input:**

```
import java.util.Scanner;
```

```
class Dividable3{

    public static void main(String[] args) {

        Scanner input = new Scanner(System.in);

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

        int num = input.nextInt();

        input.close();

        int temp = num;

        while (temp > 0)

            {

                temp = temp - 3;

            }

        if (temp == 0)

            {

                System.out.println("The number " + num + " is divisible by 3.");

            }

            else

                {

                    System.out.println("The number " + num + " is not divisible by 3.");

                }

        }

    }

}
```

**Output:**

```
C:\Windows\System32\cmd.e  X  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Dividible3.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Dividible3
Enter the number:
27
The number 27 is divisible by 3.
```

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

**Ans:**

**Input:**

```
public class Swap1{
    public static void main(String[] args) {
        int a = 10;
        int b = 20;

        System.out.println("Before swapping, a = " + a + " and b = " + b);
        a += b;
        b -= a;
        b=b<0?-b:b;
        a -=b;

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

**Output:**

```
C:\Windows\System32\cmd.e  ×  +  ∨  
Microsoft Windows [Version 10.0.26100.3323]  
(c) Microsoft Corporation. All rights reserved.  
  
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Swap1.java  
  
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Swap1  
Before swapping, a = 10 and b = 20  
After swapping, a = 20 and b = 10
```

## 2. Relational & Logical Operators

**Q6:** Write a program to find the largest of three numbers using only the ternary operator

( ? : ) .

**Ans:**

**Input:**

```
class Largest{  
    public static void main(String args[]){  
        int a= 20;  
        int b= 30;  
        int c=40;  
        String result= (a>b && a>c)? a+" is largest" :((b>a && b>c)? b +" is largest": c+  
" is largest");  
        System.out.println(result);  
    }  
}
```

**Output:**

```
C:\Windows\System32\cmd.e  ×  +  ∨

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Largest.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Largest
40 is largest

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>|
```

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

**Ans:**

**Input:**

```
import java.util.Scanner;

class LeapYear{

    public static void main(String args[]){

        Scanner input = new Scanner(System.in);

        System.out.println("Enter the year");

        int year = input.nextInt();

        if ((year % 4 == 0 && year % 100 != 0) || (year % 400 == 0))

        {

            System.out.println(year + " is a leap year.");

        }

        else

        {

            System.out.println(year + " is not a leap year.");

        }

    }

}
```

**Output:**

```
C:\Windows\System32\cmd.e  X  +  v
Microsoft Windows [Version 10.0.26100.3194]
(c) Microsoft Corporation. All rights reserved.

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac LeapYear.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java LeapYear
Enter the year
2024
2024 is a leap year.

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>|
```

**Q8:** Write a program that takes three boolean inputs and prints true if at least two of them are true .

**Hint :** Use logical operators ( && , || ).

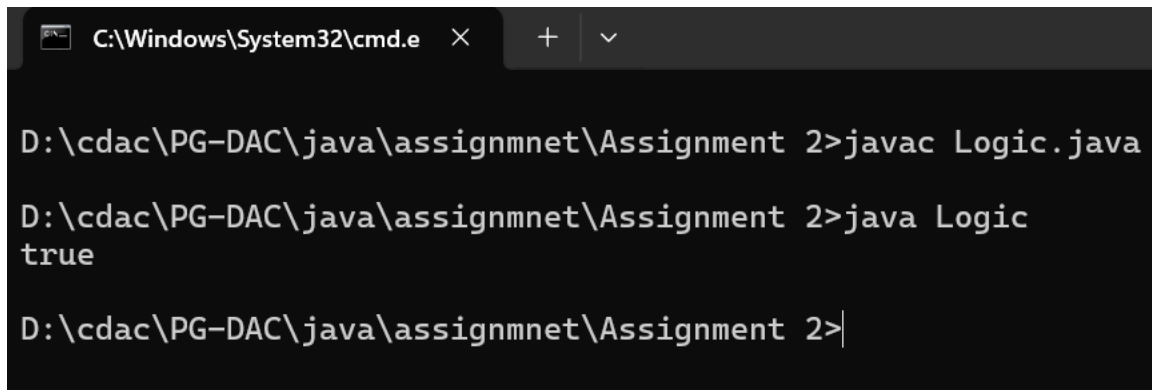
**Ans:**

**Input:**

```
class Logic{
    public static void main(String args[]){
        boolean a = true ;
        boolean b = false;
        boolean c = true;
        boolean result= ((a && b) || (b&& c) || (c&&a))?true:false;
        System.out.println(result);
    }
}
```

**Output:**





```
C:\Windows\System32\cmd.e × + ∨  
  
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Logic.java  
  
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Logic  
true  
  
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>|
```

**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 .**

**Ans:**

**Input:**

```
import java.util.Scanner;  
  
class Range{  
    public static void main(String args[]){  
        Scanner input = new Scanner(System.in);  
        System.out.println("Enter the number: ");  
        int num = input.nextInt();  
        String result=(num>=20 && num<=50)?num+" is in range":num+" is not of  
range";  
        System.out.print(result);  
    }  
}
```

}Output:

```
C:\Windows\System32\cmd.e × + ∨

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Range.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Range
Enter the number:
35
35 is in range
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Range
Enter the number:
19
19 is not of range
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Range
Enter the number:
53
53 is not of range
```

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

**Ans:**

**Input:**

```
import java.util.Scanner;

class Vowel{

    public static void main(String args[]){

        Scanner input = new Scanner(System.in);

        System.out.println("Enter the Charecter: ");

        char a = input.next().charAt(0);

        String result=(a == 'a' || a == 'e' || a == 'i' || a == 'o' || a == 'u')?a+" is in vowel":a+"
is consonant ";

        System.out.print(result);

    }

}
```

**Output:**

```
C:\Windows\System32\cmd.e  ×  +  ∨

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Vowel.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Vowel
Enter the Charecter:
a
a is in vowel
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Vowel
Enter the Charecter:
w
w is consonant
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>
```

### 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.

**Ans:**

**Input:**

```
import java.util.Scanner;

class Power{

    public static void main(String args[]){

        Scanner input = new Scanner(System.in);

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

        int n = input.nextInt();

        if((n&(n-1))==0)

        {

            System.out.print(n+" is power of 2");

        }

        else

        {

            System.out.print(n+" is not power of 2");

        }

    }

}
```

```

    }

    }

}

```

**Output:**

```

C:\Windows\System32\cmd.e
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Power.java
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Power
Enter the number:
64
64 is power of 2
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>

```

**Q12: Write a Java program to multiply a number by 8 without using \* or / operators.**

**Hint :** Use bitwise left shift ( << ).

**Ans:**

**Input:**

```

import java.util.Scanner;

class Multiply{

    public static void main(String args[]){

        Scanner input = new Scanner(System.in);

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

        int n = input.nextInt();

        int result = n<<3;

        System.out.println(result);

    }

}

```

**Output:**

```
C:\Windows\System32\cmd.e  X + v
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Multiply.java
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Multiply
Enter the number:
3
24
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>|
```

**Q13: Implement a Java program to find the absolute value of an integer using bitwise operators.**

**Hint :** `mask = num >> 31; abs = (num + mask) ^ mask;`

**Ans:**

**Input:**

```
import java.util.Scanner;
```

```
class Absolute {
```

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

```
        Scanner input = new Scanner(System.in);
```

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

```
        int num = input.nextInt();
```

```
        int mask = num >> 31;
```

```
        int abs = (num + mask) ^ mask;
```

```
        System.out.println("the absolute value of an integer "+num+" is: "+abs);
```

```
    }
```

```
}
```

**Output:**

```
C:\Windows\System32\cmd.e  X + v
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Absolute.java
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Absolute
Enter the number:
-200
the absolute value of an integer -200 is: 200
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>|
```

**Q14: Write a program to count the number of 1s (set bits) in a binary representation of a number using bitwise operations.**

**Hint :** Use  $n \& (n - 1)$  .

**Ans:**

**Input:**

```
import java.util.Scanner;
```

```
class Count{
```

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

```
        Scanner input = new Scanner(System.in);
```

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

```
        int n = input.nextInt();
```

```
        int count = 0;
```

```
        while (n > 0)
```

```
        {
```

```
            n = n & (n - 1);
```

```
            count++;
```

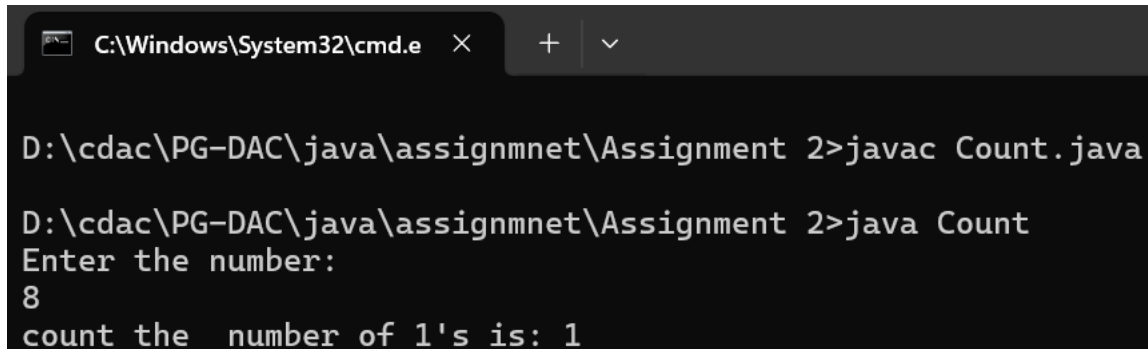
```
        }
```

```
        System.out.println("count the number of 1's is: "+count);
```

```
    }
```

```
}
```

**Output:**



```
C:\Windows\System32\cmd.e  X  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Count.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Count
Enter the number:
8
count the  number of 1's is: 1
```

**Q15: Implement a program to swap odd and even bits of a number using bitwise operators.**

**Hint :** Use masks:  $(x \& 0xAAAAAAAA) \gg 1 \mid (x \& 0x55555555) \ll 1$  .

**Ans:**

**Input:**

```
import java.util.Scanner;

class SwapOddEven{

    public static void main(String args[]){

        Scanner input = new Scanner(System.in);

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

        int a = input.nextInt();

        int result = (a & 0xAAAAAAAA) >> 1 | (a & 0x55555555) << 1 ;

        System.out.println("Ater Swap: "+ result);

    }

}
```

**Output:**

```
C:\Windows\System32\cmd.e  X  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac SwapOddEven.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java SwapOddEven
Enter the number:
20
Ater Swap: 40
```

#### 4. Ternary Operator Challenges

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

**Ans:**

**Input:**

```
import java.util.Scanner;
```

```
class Determine{
```

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

```
        Scanner input = new Scanner(System.in);
```

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

```
        int a = input.nextInt();
```

```
        String result = a>0?a+" is positive":(a<0? a+" is negative number":a+ "is
zero");
```

```
        System.out.println(result);
```

```
    }
```

```
}
```

**Output:**



```
C:\Windows\System32\cmd.e  ×  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Determine.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Determine
Enter the number:
20
20 is positive
```

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

**Ans:**

**Input:**

```
class Minimum{
    public static void main(String args[]){
        int a = 10;
        int b=20;
        int c=30;
        int d= 40;

        System.out.println("Numbers are: "+a+", "+b+", "+c+", "+d);

        String min = (a<b&&a<c&&a<d)?a+ " is Smallest
number":((b<a&&b<c&&b<d)?b+ " is Smallest number":((a<b&&c<a&&c<d)?c+ " is Smallest
number":d+ " is Smallest number"));

        System.out.println(min);
    }
}
```

**Output:**

```
C:\Windows\System32\cmd.e  X  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Minimum.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Minimum
Numbers are: 10,20,30,40
10 is Smallest number

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>|
```

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

**Ans:**

**Input:**

```
import java.util.Scanner;
```

```
class Result{
```

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

```
        System.out.println("Enter the percentage of Student:");
```

```
        Scanner input= new Scanner(System.in);
```

```
        int percentage= input.nextInt();
```

```
        String remark = percentage>=40?"Pass":"Fail";
```

```
        System.out.println(remark);
```

```
    }
```

```
}
```

**Output:**

```
C:\Windows\System32\cmd.e  X  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Result.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Result
Enter the percentage of Student:
80
Pass
```

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

**Ans:**

**Input:**

```
import java.util.Scanner;

class Case{

    public static void main(String args[]){

        System.out.println("Enter the Charecter:");

        Scanner input= new Scanner(System.in);

        char c= input.next().charAt(0);

        String result =
Character.isUpperCase(c)?"UpperCase":Character.isLowerCase(c)?"Lowercase":"not a
letter";

        System.out.println(result);

    }

}
```

**Output:**

```
C:\Windows\System32\cmd.e  X + v

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Case.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Case
Enter the Charecter:
u
Lowercase

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Case
Enter the Charecter:
U
UpperCase

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Case
Enter the Charecter:
@
not a letter
```

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

**Ans:**

**Input:**

```
import java.util.Scanner;

class Absolute1 {

    public static void main(String args[]){

        Scanner input = new Scanner(System.in);

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

        int num = input.nextInt();

        int absValue = (num < 0) ? -num : num;

        System.out.println("The absolute value is " + absValue);

    }

}
```

**Output:**

```
C:\Windows\System32\cmd.e  X + v
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Absolute1.java
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Absolute1
Enter the number:
-20
The absolute value is 20
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>|
```

### 5. Miscellaneous Operator Questions

**Q21:** Write a program that increments a number without using + or ++ operators.

**Hint :** Use bitwise - (~x) .

**Ans:**

**Input:**

```
import java.util.Scanner;

class Increments {

    public static void main(String args[]){

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

        Scanner input= new Scanner(System.in);

        int a= input.nextInt();

        System.out.println("Number befor increment:"+a);

        a=~a;

        System.out.println("Number after increment:"+a);

    }

}
```

**Output:**

```
C:\Windows\System32\cmd.e  X  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Increments.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Increments
Enter the number:
30
Number befor incriment:30
Number after incriment:31

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>
```

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

**Ans:**

**Input:**

```
import java.util.Scanner;

class Calculator{

    public static void main(String args[]){

        Scanner input= new Scanner(System.in);

        System.out.println("Enter two number: ");

        int a= input.nextInt();

        int b= input.nextInt();

        System.out.println("Enter the oprator( + , - , * , / ) :");

        char o=input.next().charAt(0);

        switch(o)

        {

            case '+':

                int sum = a+b;

                System.out.println(a+"+"+b+"="+sum);

                break;

            case '-':
```

```

        int sub = a-b;

        System.out.println(a+"-"+b+"="+sub);

        break;

    case '*':

        int mul = a*b;

        System.out.println(a+"*"+b+"="+mul);

        break;

    case '/':

        double div = a/b;

        System.out.println(a+"/"+b+"="+div);

        break;

    default:

        System.out.println("Error! Enter valid operator!!");

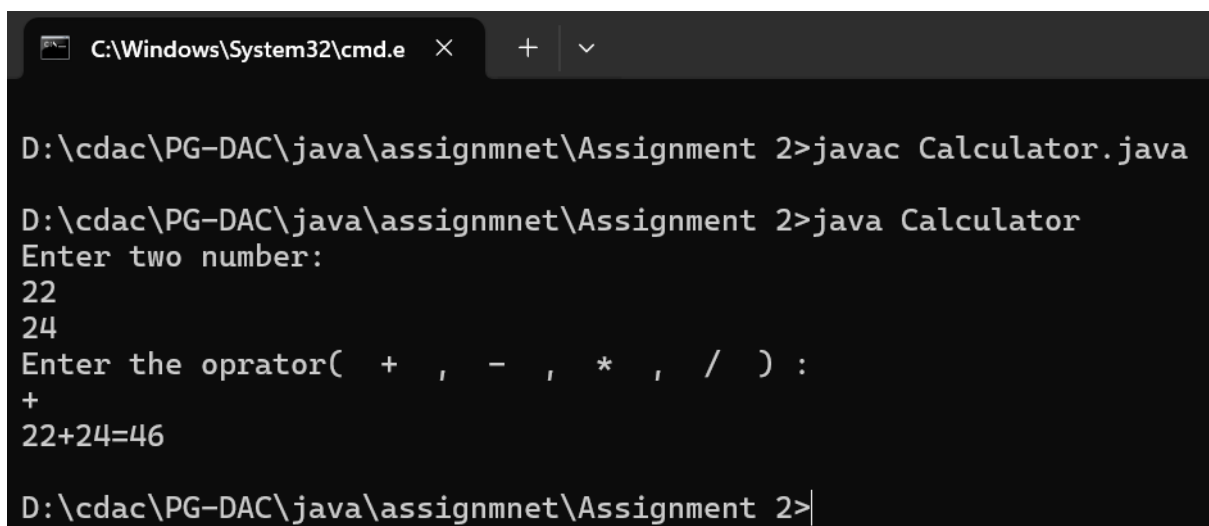
    }

}

}

```

**Output:**



```

C:\Windows\System32\cmd.e  X  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Calculator.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Calculator
Enter two number:
22
24
Enter the oprator( + , - , * , / ) :
+
22+24=46

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>

```

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

**Ans:**

**Input:**

```
import java.util.Scanner;

class Even1 {

    public static void main(String args[]){

        Scanner input= new Scanner(System.in);

        System.out.print("Enter the number: ");

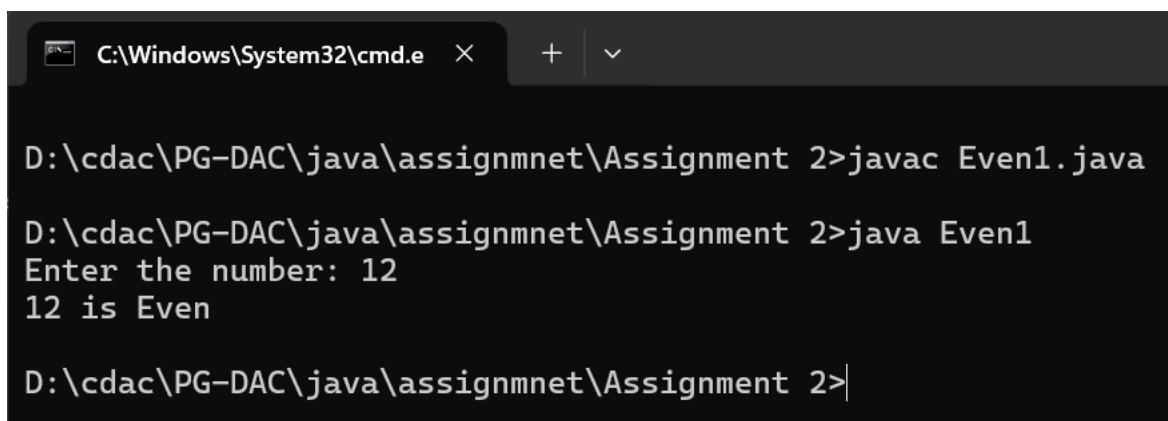
        int num= input.nextInt();

        String result=((num&1)==0)?num+" is Even":" is Odd";

        System.out.println(result);

    }

}
```

**Output:**

```
C:\Windows\System32\cmd.e  ×  +  ∨

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Even1.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Even1
Enter the number: 12
12 is Even

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>|
```

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

**Ans:**

**Input:**

```
class Even {

    public static void main(String args[]){

        System.out.print("Even number from 1 to 100 are: ");

        for(int i=1;i<=100;i++)

        {
```



```

        if((i&1)==0)
        {
            System.out.print(i+",");
        }
    }
}
}

```

**Output:**

```

C:\Windows\System32\cmd.e
Microsoft Windows [Version 10.0.26100.3323]
(c) Microsoft Corporation. All rights reserved.

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Even.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Even
Even number from 1 to 100 are: 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,
D:\cdac\PG-DAC\java\assignmnet\Assignment 2>

```

**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; }**

**Ans:**

**Input:**

```

import java.util.Scanner;

public class Reverse{

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

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

        int num = scanner.nextInt();

        int reverse = 0;

        while (num != 0) {

            int digit = num % 10;

```

```
        reverse = reverse * 10 + digit;

    num /= 10;

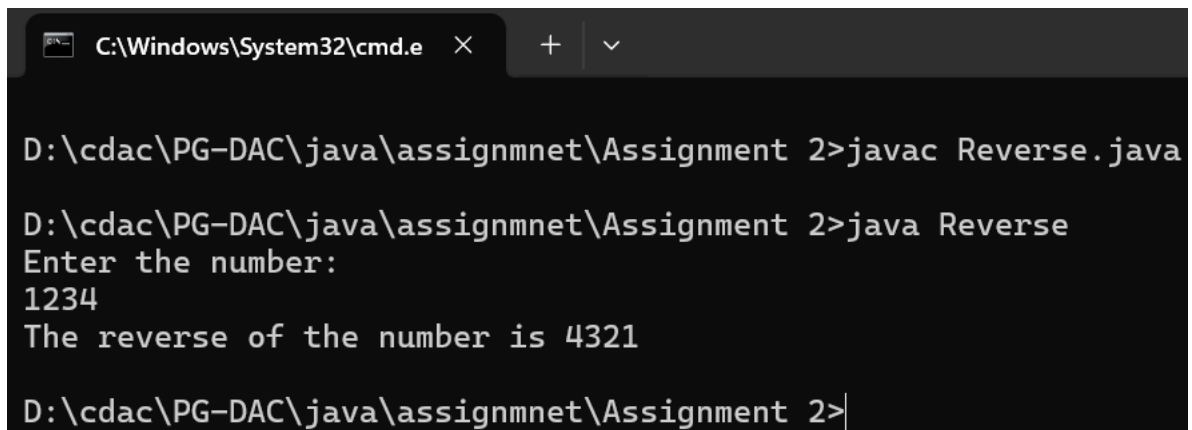
}

System.out.println("The reverse of the number is " + reverse);

}

}
```

**Output:**



```
C:\Windows\System32\cmd.e  ×  +  ∨

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>javac Reverse.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>java Reverse
Enter the number:
1234
The reverse of the number is 4321

D:\cdac\PG-DAC\java\assignmnet\Assignment 2>|
```