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.

```
import java.util.Scanner;

public class XOR{
public static void main(String args[]){
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter two Numbers:");
        int num1 = sc.nextInt();
        int num2 = sc.nextInt();
        System.out.println("Before swapping x ="+ num1 +"y = " + num2);
        num1= num1 ^ num2 ;
        num2 = num1 ^ num2 ;
        num1 = num1 ^ num2;
        System.out.println("After Swapping x = "+ num1 +" y = "+num2);
}

}
```

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

Hint : Use n & 1 to check.

```
import java.util.Scanner;

public class BitwiseEvenOdd{
public static void main(String args[]){
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter Number:");
        int num1 = sc.nextInt();
 if ((num1 & 1) == 0)
 {
 System.out.println(num1+ " is even");
 }
 else{
System.out.println( num1+ " is odd ");
 }

}

}
```

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

```
import java.util.Scanner;

public class SumOfDigit{
public static void main(String args[]){
   Scanner sc = new Scanner(System.in);
System.out.println("Enter numbers for addition");
int a = sc.nextInt();
int sum = 0;
while(a != 0)
{  int rem = a % 10;
            sum = sum +rem ;
            a = a/10;

}System.out.println("Sum of the digits is ="+sum);

}}
```

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 .

```
import java.util.Scanner;
   class Divisible{
    public static boolean IsDivisibleBy3(int num){
 while(num>=3)
 {
             num=num-3;
 }
  return num==0;
 }
public static void main(String args[]){
   Scanner sc = new Scanner(System.in);
System.out.println("Enter numbers to check divisibility of 3");
int num = sc.nextInt();
if(IsDivisibleBy3(num))
{
            System.out.println("divisible by 3");
}
else
{
            System.out.println("Not Divisible by 3");
}
            }}
```

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

```
import java.util.Scanner;

public class SwitchCase{
public static void main(String args[]){
   Scanner sc = new Scanner(System.in);
System.out.println("Enter numbers to switch");
int a = sc.nextInt();//5
int b = sc.nextInt();//10
System.out.println("Numbers before switching" + a + "and" + b);
    a+=b;//15
 b=a-b;//5
 a-=b;//10

System.out.println("Numbers after Swapping " + a +"and" +b);

}}
```

2. Relational & Logical Operators

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

```
import java.util.Scanner;

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

      System.out.println("Enter three numbers:");
      int a = sc.nextInt();
      int b = sc.nextInt();
      int c = sc.nextInt();

      // Using nested ternary operator to find the largest
      int largest = (a > b) ? ((a > c) ? a : c) : ((b > c) ? b : c);

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

   }
}
```

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

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

      System.out.println("Enter a year:");
      int year = sc.nextInt();

      // Leap year condition using logical operators
      boolean isLeap = (year % 4 == 0 && year % 100 != 0) || (year % 400 == 0);

      if (isLeap) {
         System.out.println(year + " is a leap year.");
      } else {
         System.out.println(year + " is not a leap year.");
      }

   }
}
```

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

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

```
import java.util.Scanner;

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

      System.out.println("Enter three boolean values (true/false):");
      boolean a = sc.nextBoolean();
      boolean b = sc.nextBoolean();
      boolean c = sc.nextBoolean();

      // Check if at least two of them are true
      boolean result = (a && b) || (b && c) || (a && c);

      System.out.println("At least two are true: " + result);


   }
}
```

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 .

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

      System.out.println("Enter a number:");
      int num = sc.nextInt();

      // Check if number is within range using logical && operator
      boolean isInRange = (num >= 20) && (num <= 50);

      // Print result without if-else
      System.out.println("Number is within range (20-50): " + isInRange);

      sc.close();
   }
}
```

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

```
import java.util.Scanner;

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

      System.out.println("Enter a character:");
      char ch = sc.next().toLowerCase().charAt(0);

      // Check if the character is a vowel using ternary operator
      String result = (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' || ch == 'u')
                  ? "Vowel"
                  : ((ch >= 'a' && ch <= 'z') ? "Consonant" : "Not a valid letter");

      System.out.println("The character is: " + result);
         }
}
```