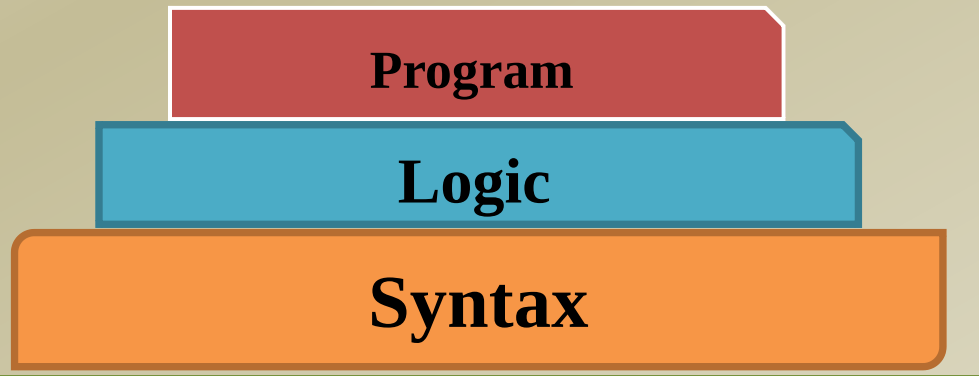
Code at Random (OPC) PVT. LTD.

Module 5: Series Programming With Alternate Sign



S = 1 – 2 + 3 – 4 … *n terms*

- In this series, the order is simple from 1 to n, but here, the sign changes continuously after every digit.
- So here, we have to code in sum variable so that addition and subtraction happens alternatively. (First addition then subtraction)
- For this, we can use an extra variable sign, whose initial value is 1 , {sign =1;} and after every iteration sign value changes
- We can multiply -1 each time, so that first we get -1 then +1 then again -1 . This is help us solving this problem

How to perform the sign logic

```
sign=1;
for( i=1 ; i<=n; i++)
 {
        s =s+ (i)*sign ;
        sign= sign*-1;
 }
```

- After Every iteration, each time the value of sign changes.
- When i=1; s=1 and sign becomes -1
- When i=2; s= 1-2 and sign will become -1* -1 = 1

More Programs

- **WAP to print the sum of the n terms of the given following series, where number of terms i.e., n will be given by the user.**

1. $S = 2 - 4 + 6 - 8 \ldots$ *n terms*
2. $S = x - \frac{x}{2} + \frac{x}{3} - \ldots$ n terms
3. $S = x - 2x + 3x - \ldots$ n terms
4. $S = 2x - \frac{3x}{2} + \frac{4x}{3} - \ldots$ n terms
5. $S = x - \frac{x^2}{3} + \frac{x^3}{5} - \ldots$ n terms
6. $S = \frac{1}{a+b} - \frac{1}{a+2b} + \frac{1}{a+3b} - \ldots$ n terms

Solution to above questions

1.
```
public static void main(String[] Args)    {
    int i,n,x,sign=1;
    double s= 0.0;
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter the terms in the series");
    n=sc.nextInt();
    System.out.println("Enter the value of x");
    x= sc.nextInt();
    for(i=1;i<=n;i++)  {
        s= s+(2*i)*sign;
        sign= sign*-1;
    }
    System.out.print(s);
}
```

2.
```
public static void main(String[] Args) {
    int i,n,x,sign=1;
    double s= 0.0;
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter the terms in the series");
    n=sc.nextInt();
    System.out.println("Enter the value of x");
    x= sc.nextInt();
    for(i=1;i<=n;i++)  {
        s= s+(x/i)*sign;
        sign= sign*-1;
    }
    System.out.print(s);
}
```

Solution to above questions

3.
```
public static void main(String[] Args)  {
    int i,n,x,sign=1;
    double s= 0.0;
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter the terms in the series");
    n=sc.nextInt();
    System.out.println("Enter the value of x");
    x= sc.nextInt();
    for(i=1;i<=n;i++)  {
        s= s+(x*i)*sign;
        sign= sign*-1;
    }
    System.out.print(s);
}
```

4.
```
public static void main(String[] Args) {
    int i,n,x,sign=1;
    double s= 0.0;
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter the terms in the series");
    n=sc.nextInt();
    System.out.println("Enter the value of x");
    x= sc.nextInt();
    for(i=1;i<=n;i++)  {
     s= s+(((i+1)*x)/i)*sign;
       sign= sign*-1;
    }
    System.out.print(s);
}
```

Solution to above questions

5.
```
public static void main(String[] Args)  {
    int i,n,x,sign=1;
    double s= 0.0;
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter the terms in the series");
    n=sc.nextInt();
    System.out.println("Enter the value of x");
    x= sc.nextInt();
    for(i=1;i<=n;i++)  {
      s= s+(Math.pow(x,i)/(2*i-1))*sign;
     sign= sign*-1;
    }
    System.out.print(s);
  }
```

6.
```
public static void main(String[] Args)   {
    int i,n,a,b,sign=1;
    double s= 0.0;
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter the terms in the series");
    n=sc.nextInt();
    System.out.println("Enter the value of a and b");
    a= sc.nextInt();
    b= sc.nextInt();
    for(i=1;i<=n;i++)  {
        s= s+(1.0/(a+i*b))*sign;
        sign= sign*-1;
    }
    System.out.print(s);
```