

Code  *Random*
(OPC) PVT. LTD.

Nested Loops: Factorial Series Programming



SOME EXAMPLES OF SERIES

- $S = 1! + 2! + 3! + \dots n \text{ terms}$
- $S = x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots n \text{ terms}$
- $S = 1 - x + \frac{x^2}{3!} - \frac{x^3}{5!} + \dots n \text{ terms}$
- $S = 1 - (1+2) + (1+2+3) \dots n \text{ terms}$
- $S = \frac{1+2}{1 \times 2} - \frac{1+2+3}{1 \times 2 \times 3} + \frac{1+2+3+4}{1 \times 2 \times 3 \times 4} - \dots n \text{ terms}$

- *As we have practiced series programs earlier in for loop, here we can see that here, in every term of the series there is a factorial.*
- *So, here for finding factorial we will put an extra loop.*



Programming Based On Factorial Series

$$S = 1! + 2! + 3! + \dots n \text{ terms}$$

```
import java.util.*;
class series1 {
    public static void main(String Args[]) {
        int n,i,f=1,j;
        double sum=0.0;
        Scanner sc= new Scanner(System.in);
        System.out.println("Enter the number of terms");
        n= sc.nextInt();
        for(i=1;i<=n;i++)
        {
            f=1;
            for(j=1;j<=i;j++)
            {
                f=f*j;
            }
            sum=sum+f;
        }
        System.out.println(sum);
    }
}
```

$$S = x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots \quad n \text{ terms}$$

```
import java.util.*;
class series2 {
    public static void main(String Args[]) {
        int n,i,f=1,j;
        double sum=0.0;
        Scanner sc= new Scanner(System.in);
        System.out.println("Enter the number of terms");
        n= sc.nextInt();
        System.out.println("Enter the value of x");
        int x=sc.nextInt();
        for(i=1;i<=n;i++)
        {
            f=1;
            for(j=1;j<=i;j++)
            {
                f=f*j;
            }
            sum= sum+(Math.pow(x,i)/f);
        }
        System.out.println(sum);
    }
}
```

$$S = x + \frac{2x}{2!} + \frac{3x}{3!} + \dots \text{ } n \text{ terms}$$

```
import java.util.*;
class series3 {
    public static void main(String Args[]) {
        int n,i,f=1,j;
        double sum=0.0;
        Scanner sc= new Scanner(System.in);
        System.out.println("Enter the number of terms");
        n= sc.nextInt();
        System.out.println("Enter the value of x");
        int x=sc.nextInt();
        for(i=1;i<=n;i++)
        {
            f=1;
            for(j=1;j<=i;j++)
            {
                f=f*j;
            }
            sum=sum+((x*i)/f);
        }
        System.out.println(sum);
    }
}
```

$$S = \frac{x}{2!} + \frac{2x}{3!} + \frac{3x}{4!} + \dots \text{ } n \text{ terms}$$

```
import java.util.*;
class series4 {
    public static void main(String Args[]) {
        int n,i,f=1,j;
        double sum=0.0;
        Scanner sc= new Scanner(System.in);
        System.out.println("Enter the number of terms");
        n= sc.nextInt();
        System.out.println("Enter the value of x");
        int x=sc.nextInt();
        for(i=1;i<=n;i++)
        {
            f=1;
            for(j=1;j<=i+1;j++)
            {
                f=f*j;
            }
            sum=sum+((x*i)/f);
        }
        System.out.println(sum);
    }
}
```

$$S = x + \frac{2x}{3!} + \frac{3x}{5!} + \dots \text{ } n \text{ terms}$$

```
import java.util.*;
class series5 {
    public static void main(String Args[]) {
        int n,i,f=1,j;
        double sum=0.0;
        Scanner sc= new Scanner(System.in);
        System.out.println("Enter the number of terms");
        n= sc.nextInt();
        System.out.println("Enter the value of x");
        int x=sc.nextInt();
        for(i=1;i<=n;i++)
        {
            f=1;
            for(j=1 ; j<=2*i-1 ; j++)
            {
                f=f*j;
            }
            sum=sum+((x*i)/f);
        }
        System.out.println(sum);
    }
}
```


$$S = x + \frac{x^2}{4!} + \frac{x^3}{9!} + \dots \text{ } n \text{ terms}$$

```
import java.util.*;
class series6 {
    public static void main(String Args[]) {
        int n,i,f=1,j;
        double sum=0.0;
        Scanner sc= new Scanner(System.in);
        System.out.println("Enter the number of terms");
        n= sc.nextInt();
        System.out.println("Enter the value of x");
        int x=sc.nextInt();
        for(i=1;i<=n;i++)
        {
            f=1;
            for(j=1 ; j<=i*i ; j++)
            {
                f=f*j;
            }
            sum=sum+((x*i)/f);
        }
        System.out.println(sum);
    }
}
```