

# Function Library

```
In [12]: import math

# checking for validity of input - whether it is numeric value and greater than 0 or not
# also checks for 0 separately
# returns after conversion to int datatype
def check_natural_number(n):
    try :
        int(n)
        res = True
    except :
        res = False

    if res==True and int(n)==0:
        return 'zero'
    elif res==True and int(n)>0:
        return(int(n))
    else:
        # printing error message
        print("Invalid input. Please enter a natural number.")
        return 'F'

# checking for validity of input - whether it is float number or not
# returns after conversion to float datatype
def check_number(n):
    try :
        float(n)
        res = True
    except :
        res = False

    if res==True:
        return(float(n))
    else:
        # printing error message
        print("Invalid input. Please enter a number.")
        return 'F'
```

```
In [ ]: # function for sum of first n natural numbers
def sum_natural_numbers(n):
    sum=0
    for i in range(n+1):
        sum=sum+i
    print("The sum of first " + str(n) + " odd numbers is " + str(sum))

# function for sum of first n odd numbers
def sum_odd_numbers(n):
    sum=0
    for i in range(n):
        sum=sum + 2*i+1
    print("The sum of first " + str(n) + " odd numbers is " + str(sum))

# function for sum of n terms of an AP
# with first term and number of terms taken as input
def sum_AP(a,n,d=1.5):
    sum=0
    print("Common difference is : " + str(d))
    for i in range(n):
        sum=sum+a
        a=a+d
    print("\nThe sum of first " + str(n) + " terms of an AP is " + str(sum))

# function for sum of n terms of a GP
# with first term and number of terms taken as input
def sum_GP(a,n,r=0.5):
    sum=0
    print("Common ratio is : " + str(r))
    for i in range(n):
        sum=sum+a
        a=a*r
    print("\nThe sum of first " + str(n) + " terms of an GP is " + str(sum))

# function for sum of n terms of a HP
# with first term and number of terms taken as input
def sum_HP(a,n,d=1.5):
    sum=0
    print("Common difference is : " + str(d))
    for i in range(n):
        sum=sum+1/a
        a=a+d
    print("\nThe sum of first " + str(n) + " terms of an HP is " + str(sum))
```

```
In [ ]: # function for finding factorial of a number
def FACTORIAL(n):
    fact=1
    while n>0:
        fact=fact*n
        n-=1
    return fact

# sine function
# with argument of sine, and number of terms in its taylor expansion taken as
input
def SINE(x,n):
    sum=0
    for i in range(n): # starting the index with i=1 because factorial of -1
is not defined
        d=(-1)**(i) * x**(2*i+1)/FACTORIAL(2*i+1) # taylor expansion terms
        sum=sum+d
    return sum

# exponential function
# with argument of sine and number of terms in its taylor expansion taken as i
nput
def EXP(x,n):
    sum=0
    for i in range(0,n):
        d=(-1)**i * x**i/FACTORIAL(i) # taylor expansion terms
        sum=sum+d
    return sum
```