This notebook has various examples of recursion functiona and simple application based example like simple calculator, HCF,LCM and log etc.,

This notebook can be accessd via the Github Link (https://github.com/amitvsuryavanshi04/SIC_programming_and_coding)

Program 21 Sum of natural numbers

```
limit = int(input("Enter the limit: "))
#initialize the sum
sum = 0;
for i in range(1, limit + 1):
  sum += i
# Print the sum
print("The sum of natural numbers up to", limit, "is:", sum)
```

```
Enter the limit: 100
The sum of natural numbers up to 100 is: 5050
```


Program 22 finding the LCM of two input numbers

```
def compute_lcm(x, y):
    if x > y:  # choose the greater number
        greater = x
    else:
        greater = y
    while(True):
        if((greater % x == 0) and (greater % y == 0)):
            lcm = greater
            break
        greater += 1
    return lcm

num1 = int(input('Enter the number: '))
num2 = int(input('Enter the number: '))
```

```
print("The L.C.M. is", compute_lcm(num1, num2))
```

```
Enter the number: 29
Enter the number: 38
The L.C.M. is 1102
```

Program 23 finding the HCF

```
# define a function
def compute_hcf(x, y):
# choose the smaller number
    if x > y:
      smaller = y
    else:
      smaller = x
    for i in range(1, smaller+1):
      if((x % i == 0) and (y % i == 0)):
        hcf = i
    return hcf
num1 = int(input('Enter the number: '))
num2 = int(input('Enter the number: '))
print("The H.C.F. is", compute_hcf(num1, num2))
```



```
Enter the number: 30
Enter the number: 15
The H.C.F. is 15
```

Program 24 Decimanl to binary, ocatal and hexadecimal conversion

```
dec_num = int(input('Enter a decimal number: '))

print("The decimal value of", dec_num, "is:")
print(bin(dec_num), "in binary.")
print(oct(dec_num), "in octal.")
print(hex(dec_num), "in hexadecimal.")
```

```
Enter a decimal number: 20
The decimal value of 20 is:
```

```
0b10100 in binary.
0o24 in octal.
0x14 in hexadecimal.
```

Program 25 finding the ASCII value of a character

```
char = str(input("Enter the character: "))
print("The ASCII value of '" + char + "' is", ord(char))
```

```
Enter the character: i
The ASCII value of 'i' is 105
```

Program 26 making a simple calculator with 4 basic mathematical operations


```
def add(x,y):
  return x + y

def substract(x,y):
  return x - y

def multiply(x,y):
  return x * y

def divide(x,y):
  return x / y

print("Select operation.")
print("1.Add")
print("2.Substract")
print("3.Multiply")
print("4.Divide")

while True:
  choice = input("Enter choice(1/2/3/4): ")
  if choice in ('1', '2', '3', '4'):
    try:
      num1 = float(input("Enter first number: "))
      num2 = float(input("Enter second number: "))
    except ValueError:
```

```
    except ValueError:
      print("Invalid input. Please enter a number.")
      continue
    if choice == '1':
      print(num1, "+", num2, "=", add(num1, num2))
    elif choice == '2':
      print(num1, "-", num2, "=", substract(num1, num2))
    elif choice == '3':
      print(num1, "*", num2, "=", multiply(num1, num2))
    elif choice == '4':
      print(num1, "/", num2, "=", divide(num1, num2))
    next_cal = input("Let's do next calculation? (yes/no): ")
    if next_cal == "no":
      break
  else:
    print("Invalid Input")
```

```
Select operation.
1.Add
2.Substract
3.Multiply
4.Divide
Enter choice(1/2/3/4): 1
Enter first number: 20
Enter second number: 30
20.0 + 30.0 = 50.0
Let's do next calculation? (yes/no): yes
Enter choice(1/2/3/4): 3
Enter first number: 20
Enter second number: 2
20.0 * 2.0 = 40.0
Let's do next calculation? (yes/no): no
```


Program 27 fibonacci sequence using Recursion

```
def recur_fibo(n):
  if n <= 1:
    return n
  else:
    return(recur_fibo(n-1) + recur_fibo(n-2))
nterms = int(input("Enter the number of terms (greater than 0): "))
```

```
# check if the number of terms is valid
if nterms <= 0:
  print("Plese enter a positive integer")
else:
  print("Fibonacci sequence:")
  for i in range(nterms):
    print(recur_fibo(i))
```

```
Enter the number of terms (greater than 0): 20
Fibonacci sequence:
0
1
1
2
3
5
8
13
21
34
55
89
144
233
377
610
987
1597
2584
4181
```


Program 28 factorial using recursion

```
# Factorial of a number using recursion
def recur_factorial(n):
  if n == 1:
    return n
  else:
    return n*recur_factorial(n-1)
num = int(input("Enter the number: "))
# check if the number is negative
if num < 0:
```

```
  print("Sorry, factorial does not exist for negative numbers")
elif num == 0:
  print("The factorial of 0 is 1")
else:
  print("The factorial of", num, "is", recur_factorial(num))
```

```
Enter the number: 10
The factorial of 10 is 3628800
```

Program 29 calculation of body mass index

```
def bodymassindex(height, weight):
  return round((weight / height**2),2)
h = float(input("Enter your height in meters: "))
w = float(input("Enter your weight in kg: "))
print("Welcome to the BMI calculator.")
bmi = bodymassindex(h, w)
print("Your BMI is: ", bmi)
if bmi <= 18.5:
  print("You are underweight.")
elif 18.5 < bmi <= 24.9:
  print("Your weight is normal.")
elif 25 < bmi <= 29.29:
  print("You are overweight.")
else:
  print("You are obese.")
```



```
Enter your height in meters: 1.8
Enter your weight in kg: 70
Welcome to the BMI calculator.
Your BMI is:  21.6
Your weight is normal.
```

Program 30 calculation of natural logarithm of any number

```
import math
num = float(input("Enter a number: "))
if num <= 0:
  print("Please enter a positive number.")
else:
```

```
else:
# Calculate the natural logarithm (base e) of the number
  result = math.log(num)
print(f"The natural logarithm of {num} is: {result}")
```

```
Enter a number: 2
The natural logarithm of 2.0 is: 0.6931471805599453
```