

Recursion:

We know that in python, a function can call other function. It is even possible for the function to call itself. These type of construct are termed as recursive function.

Example:

python program to print factorial of a number using recursion/recursive function

```
def factorial(num):  
    """  
    This is a recursive function to find the factorial of a given  
    number  
    """  
    if num == 1:  
        return 1  
    else:  
        return (num * factorial(num-1))  
    #return 1 if num == 1 else (num * factorial(num -1 ))
```

```
num = int(input("enter the value of num: "))  
print("factorial of {0} is {1}".format(num,factorial(num)))
```

*# 6*120=720*

enter the value of num: 5
factorial of 5 is 120

```
# factorial (5 )  
#1) num = 5 ---> if num == 1 false ---> return (5* factorial(4))  
# stack data structure index1 # 5 * 24 = 120  
#2) num = 4 ---> if 4 == 1 false ---> return ( 4 * factorial(3))  
# index 2 # 4 * 6 = 24  
# 3) num = 3 ---> if 3 == 1 false ---> return (3 * factorial(2))  
# index 3 # 3 * 2 = 6  
#4) num == 2 ---> if 2 == 1 false ---> return ( 2 * factorial(1))  
# index 4 # 2*1 = 2  
#5) num == 1 ---> if 1 ==1 true return 1
```

Advantages:

1. Recursive function make the code look clean and elegant.
2. A complex task can be broken down into simpler sub- problems using recursion.

3. Sequence generation is easier with recursion than using some nested iteration.

Disadvantages:

1. Sometimes the logic behind recursion is hard to follow through.
2. Recursive calls are expensive (inefficient) as they take up a lot of memory and time.
3. Recursive function hard to debug.

Python Program to display the fibonacci sequence up to n-th term using recursive function

```
def fibonacci(num): # num 3
    """
    Recursive function to print fibonacci sequence
    """
    if num==0 or num == 1:
        return num
    else:
        return fibonacci(num-1) + fibonacci(num-2) # fib(2) +
fib(1) ---> 1 + 1 = 2
# return num if num <=1 else fibonacci(num-1) + fibonacci(num-2)

nterms = int(input("enter the value of nterms: ")) # 4
print("Fibonacci Sequence")
for num in range(nterms): # [0,1,2,3]
    print(fibonacci(num)) # 3

enter the value of nterms: 15
Fibonacci Sequence
0
1
1
2
3
5
8
13
21
34
55
89
144
233
377
```