SNS COLLEGE OF ENGINEERING

Kurumbapalayam(Po), Coimbatore – 641 107
Accredited by NAAC-UGC with 'A' Grade
Approved by AICTE, Recognized by UGC & Affiliated to Anna University, Chennai

Department of Artificial Intelligence and Data Science

Course Name – Computational Thinking and Python Programming

I Year / I Semester

Unit 3-CONTROL FLOW, FUNCTIONS

Fruitful Function

- Fruitful function
- Void function
- Return values
- Parameters
- Local and global scope
- Function composition
- Recursion

Fruitful function:

A function that returns a value is called fruitful function.

Example:

```
Root=sqrt(25)
```

Example:

```
def add():
a=10
b=20
c=a+b
return c
c=add()
print(c)
```

Void Function

A function that perform action but don’t return any value.

Example:

```
print(“Hello”)
```

Example:

```
def add():
a=10
b=20
c=a+b
print(c)
add()
```

Return values:

return keywords are used to return the values from the function.

example:

```
return a – return 1 variable
return a,b– return 2 variables
return a,b,c– return 3 variables
return a+b– return expression
return 8– return value
```

PARAMETERS / ARGUMENTS:

- Parameters are the variables which used in the function definition. Parameters are inputs to functions. Parameter receives the input from the function call.
- It is possible to define more than one parameter in the function definition.

Types of parameters/Arguments:

1. Required/Positional parameters
2. Keyword parameters
3. Default parameters
4. Variable length parameters

Required/ Positional Parameter:

The number of parameter in the function definition should match exactly with number of arguments in the function call.

Example

```
def student( name, roll ):
print(name,roll)
student(“George”,98)
```

Output:

George 98

Keyword parameter:

When we call a function with some values, these values get assigned to the parameter according to their position. When we call functions in keyword parameter, the order of the arguments can be changed.

Example

```
def student(name,roll,mark):
print(name,roll,mark)
student(90,102,"bala")
```

Output:

90 102 bala

Default parameter:

Python allows function parameter to have default values; if the function is called without the argument, the argument gets its default value in function definition.

Example

```
def student( name, age=17):
print (name, age)
student( “kumar”):
student( “ajay”):
```

Output:

Kumar 17
Ajay 17

Variable length parameter

- Sometimes, we do not know in advance the number of arguments that will be passed into a function.

- Python allows us to handle this kind of situation through function calls with number of arguments.
- In the function definition we use an asterisk (*) before the parameter name to denote this is variable length of parameter.

Example

```
def student( name,*mark):
print(name,mark)
student (“bala”,102,90)
```

Output:

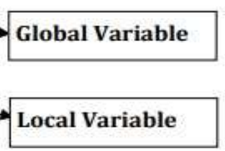
bala (102 ,90)

Local and Global Scope

Global Scope

- The *scope* of a variable refers to the places that you can see or access a variable.
- It can be created by defining a variable outside the function.
- A variable with global scope can be used anywhere in the program.

Example	output

a=50
def add():
  b=20
  c=a+b
  print©
def sub():
  b=30
  c=a-b
  print©
print(a)
	
	70
	
	20
	
	50

Local Scope A variable with local scope can be used only within the function .

Example	output

def add():
  b=20
  c=a+b
  print©
	70

def sub():
  b=30
  c=a-b
  print©
	20

print(a) print(b)	error error

Local Variable

Local Variable

Function Composition:

- Function Composition is the ability to call one function from within another function
- It is a way of combining functions such that the result of each function is passed as the argument of the next function.
- In other words the output of one function is given as the input of another function is known as function composition.

Example:

```
math.sqrt(math.log(10))
def add(a,b):
c=a+b
return c
def mul(c,d):
e=c*d
return e
c=add(10,20)
e=mul(c,30)
print(e)
```

Output:

900

Recursion

A function calling itself till it reaches the base value - stop point of function call. Example: factorial of a given number using recursion

Factorial of n

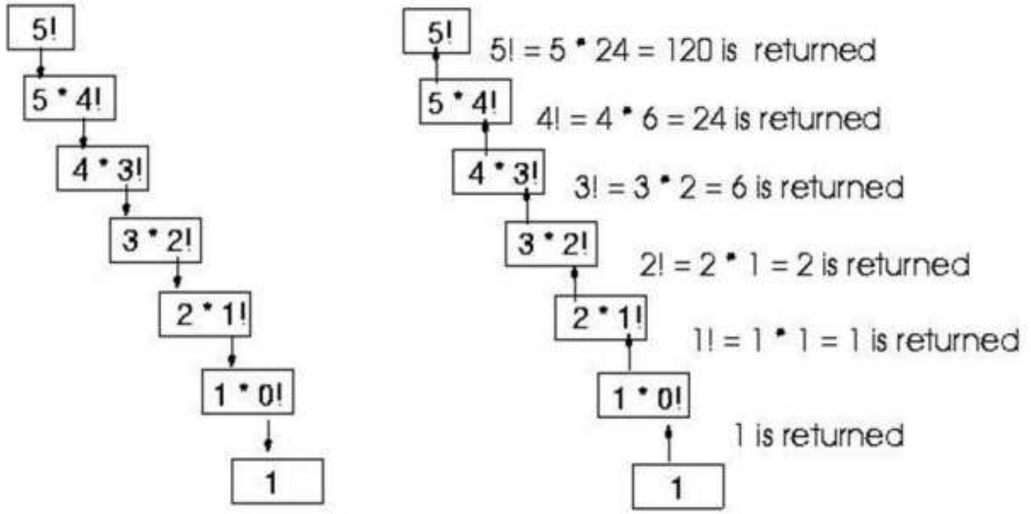
```
def fact(n):
        if(n==1):

        return 1
        else:
        return n*fact(n-1)
n=eval(input("enter  no. to  find fact:"))
fact=fact(n)
print("Fact is",fact)
```

Output

```
enter no. to find fact:5
Fact is 120
```

Explanation



Examples:

1. sum of n numbers using recursion
2. exponential of a number using recursion

Sum of n numbers

```
def sum(n):
if(n==1):
return 1
else:
return n*sum(n-1)
n=eval(input("enter  no. to  find
sum:"))
sum=sum(n)
print("Fact is",sum)
```

Output

```
enter no. to find sum:10
Fact is 55
```