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Day 24 - Batch 3 – Python Language

Chapter 013 Functions, Function Types, Declaration etc

To watch the recorded Python and Data Science videos in YouTube:

Day 24- Batch 3 - Functions, Function Types, Declaration etc

https://youtu.be/OeWpYgAOnh4

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https://t.me/joinchat/lUZEsr-zidpjZjEx

To Join the class, please fill the form :

https://forms.gle/QFpLHwAoinFaX2cE6

Join Zoom Meeting (From Sep 26 2022 to Oct 26 2022)

https://us06web.zoom.us/j/88900302653?pwd=MVBFUlhqTTE1LzFFRUVpTzZ2S1Vsdz09

Meeting ID: 889 0030 2653

Passcode: 1234

Monday through Friday 8 PM to 10 PM IST (From Sep 26 2022 to Oct 26 2022)

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- We take utmost care to provide credits whenever we use materials from external source/s. If we missed to acknowledge any content that we had used here, please feel free to inform us at info@DataScienceInTamil.com.
- All the programming examples in this document are for FREE teaching purposes only.

Thanks to all the open-source community and to the below websites from where we take references / content /code example. definitions, please use these websites for further reading:

- Book : Python Notes For Professionals
- https://www.w3schools.com
- https://www.geeksforgeeks.org
- https://www.askpython.com
- https://docs.python.org
- https://www.programiz.com/
- https://www.openriskmanagement.com/
- https://pynative.com/python-sets/
- https://www.alphacodingskills.com/
- https://codedestine.com/
- https://appdividend.com/
- https://freecontent.manning.com/
- https://stackoverflow.com/
- https://datagy.io/python-isdigit
- https://www.datacamp.com/community/tutorials/functions-python-tutorial
- https://data-flair.training/blogs/python-function/

- https://problemsolvingwithpython.com/07-Functions-and-Modules/07.07-Positional-and-Keyword-Arguments/
- https://www.tutorialsteacher.com/python/callable-method

TOPIC: FUNCTIONS

- What is function
- what is function signature in python?
- Rules for naming python function (identifier)
- The pass Statement in a function

Types of Functions in Python

1. Function with no parameter and with No Return value.
2. Function with parameter and No Return value.
3. Function with parameter and return value.
4. Returning Multiple Values in a function
5. Positional arguments
6. Function with default arguments. - Default arguments are optional arguments
7. Function with arbitrary positional arguments.
8. Built in Functions
9. User defined functions
10. Function with arbitrary keyword arguments.
    - * kargs
    - **kwargs
11. High Order Functions
12. Anonyms Functions / Lambda Functions
13. Recursion functions

PS: Callable fn (dict)

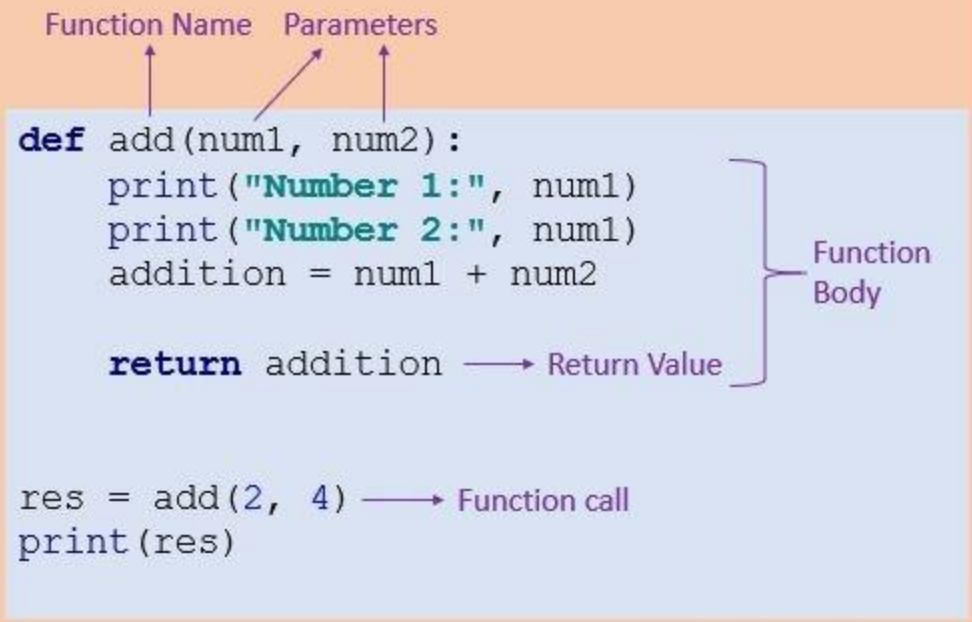
What is function

1. A function is a block of code which only runs when it is called.
2. You can pass data, known as parameters, into a function.
3. A function can return data as a result.

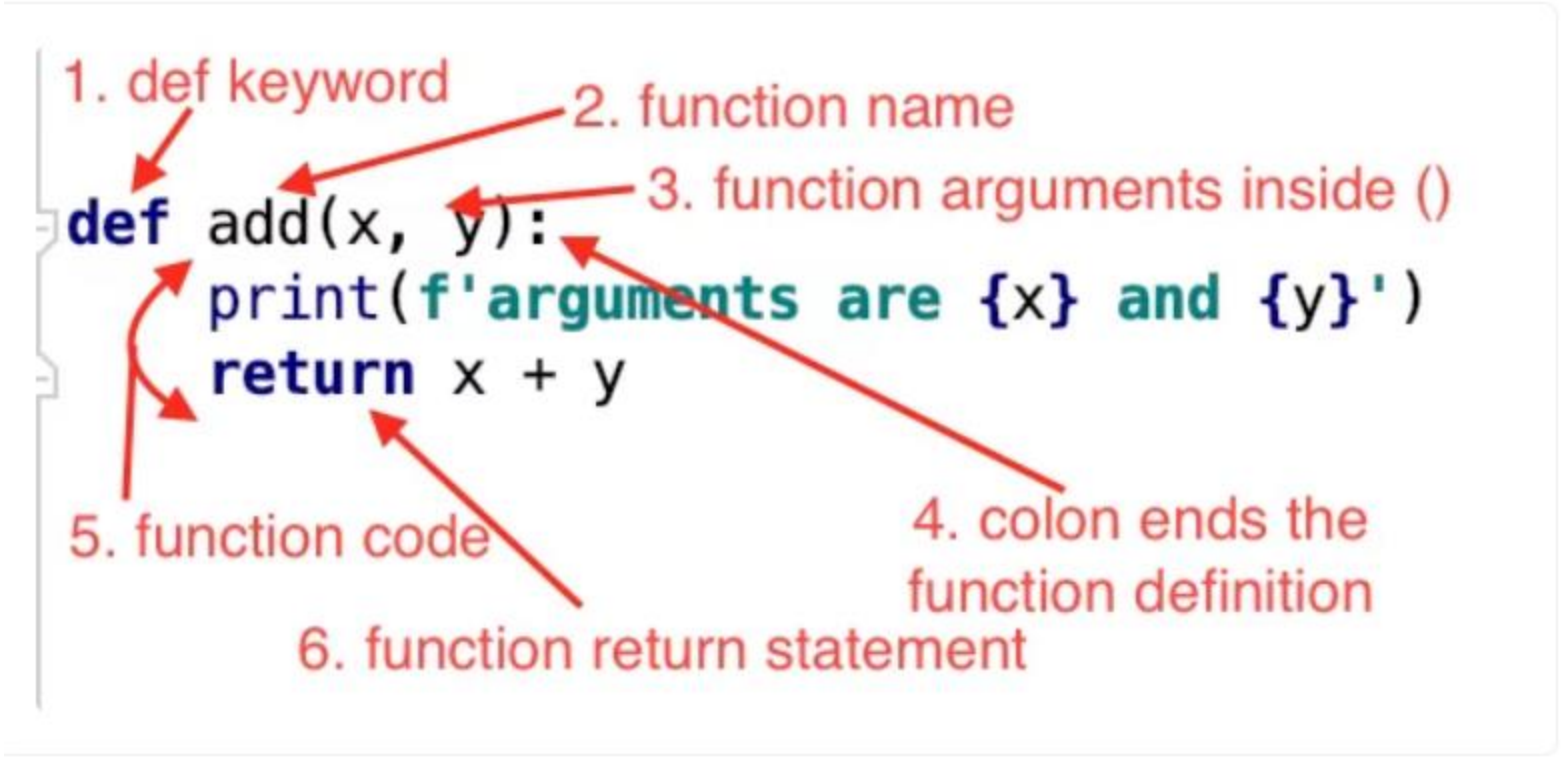
Python Functions

In Python, the **function is a block of code defined with a name**

- A Function is a block of code that only runs when it is called.
- You can pass data, known as parameters, into a function.
- Functions are used to perform specific actions, and they are also known as methods.
- **Why use Functions**? To reuse code: define the code once and use it many times.



PYnative



Python function in any programming language is a sequence of statements in a certain order, given a name. When called, those statements are executed. So we don't have to write the code again and again for each [type of] data that we want to apply it to. This is called code re-usability

function is a piece of code written to carry out a specified task. To carry out that specific task, the function might or might not need multiple inputs.

- A function is a block of code with a name.
- We can call a function by its name.
- The code inside a function only runs when it's called.
- A function can accept data from the caller program, it's called as function parameters.
- The function parameters are inside parentheses and separated by a comma. A function can accept any number of arguments.
- A function can return data to the caller program. Unlike other popular programming languages, Python functions definition doesn't specify the return type.
- We can't use reserved keywords as the function name. A function name must follow the Python identifiers definition rules.

Rules to follow to naming python function

1. Same rules of declaring variables
2. It can begin with either of the following: A-Z, a-z, and underscore(_).

3. The rest of it can contain either of the following: A-Z, a-z, digits(0-9), and underscore(_).
4. A reserved keyword may not be chosen as an identifier.

What is function signature in python?

What is a function signature?
A function signature (or type signature, or method signature) defines input and output of functions or methods. A signature can include: parameters and their types. a return value and type.

1. parameters and their types
2. it returns a value and type, return can returns MULTIPLE VALUES

1- Function with no parameter and with a No Return value.

Defining and call a function

```
def my_function():
  print("Say Hello from a function")

my_function()
```

2- Python Function with parameter and No Return value.

- Information can be passed into functions as arguments.
- Arguments are specified after the function name, inside the parentheses. You can add as many arguments as you want, just separate them with a comma.
- A parameter is the variable listed inside the parentheses in the function definition.
- An argument is the value that is sent to the function when it is called.

```
def my_function(mySubject):
  print("I am studying ", mySubject)

my_function("Python")
my_function("Numpy")
my_function("Pandas")
```

output

I am studying Python

I am studying Numpy

I am studying Pandas

3 - Function with argument and return value.

```
def add_Fucntion(a, b):
    result = a + b
    return result

add_Fucntion(2, 2)
```

```
------------
def add_Function(internalMark, externaMark):
    totalMarkPlus = internalMark + externaMark
    totalMarkSub = internalMark - externaMark
    totalMarkMulti = internalMark * externaMark
    return [totalMarkPlus, totalMarkSub, totalMarkMulti]

a= add_Function(5,25)
print(a)
print(type(a))

print("-----------------")

a, b, c = add_Function(5,25)
print(a)
print(b)
print(c)
print(type(a))
print(type(b))
```

---

4 - Returning Multiple Values in a function via return statement

```
def add_Fucntion(a, b):
    addResult = a + b
    subResult = a * b
    multiResult = a * b

    return addResult,subResult,multiResult

result = add_Fucntion(10,2)
print(result)
---------------
```

5-Positional arguments

An argument is a **variable, value, object, or function** passed to a function or method as input. Positional arguments are arguments that need to be included in the proper position or order.

The first positional argument always needs to be listed first when the function is called. The second positional argument needs to be listed second and the third positional argument listed third, etc.

```
def add_Function(internalMark, externaMark):
    totalMarkPlus = internalMark + externaMark
    print("My Internal mark is ", internalMark)
    print("My External mark is ", externaMark)
    return totalMarkPlus

result =  add_Function(externaMark=75, internalMark=25)
print(result)
```

6-Function with default arguments. –

(Default arguments are optional arguments)

```
def add_Function(externaMark, internalMark=51):
    totalMarkPlus = internalMark + externaMark
    print("My Internal mark is ", internalMark)
    print("My External mark is ", externaMark)
    return totalMarkPlus

result =  add_Function(20,50)
print(result)
```

7-Function with arbitrary positional arguments.

```
def add_Function(externaMark=20, internalMark=51):
    totalMarkPlus = internalMark + externaMark
    print("My Internal mark is ", internalMark)
    print("My External mark is ", externaMark)
    return totalMarkPlus

result =  add_Function()
print(result)
```

8-Built in Functions

See this url and takes notes from here

https://data-flair.training/blogs/python-built-in-functions/

Built-in Functions

The Python interpreter has a number of functions and types built into it that are always available. They are listed here in alphabetical order.

https://docs.python.org/3/library/functions.html

Home work: Assign some one to take the notes

Built-in Functions			
A	**E**	**L**	**R**
abs()	enumerate()	len()	range()
aiter()	eval()	list()	repr()
all()	exec()	locals()	reversed()
any()			round()
anext()	**F**	**M**	
ascii()	filter()	map()	**S**
	float()	max()	set()
B	format()	memoryview()	setattr()
bin()	frozenset()	min()	slice()
bool()			sorted()
breakpoint()	**G**	**N**	staticmethod()
bytearray()	getattr()	next()	str()
bytes()	globals()		sum()
		O	super()
C	**H**	object()	
callable()	hasattr()	oct()	**T**
chr()	hash()	open()	tuple()

Built-in Functions			
classmethod() compile() complex() **D** delattr() dict() dir() divmod()	help() hex() **I** id() input() int() isinstance() issubclass() iter()	ord() **P** pow() print() property()	type() **V** vars() **Z** zip() _ __import__()

Built-in functions, such as help() to ask for help, min() to get the minimum value, print() to print an object to the terminal

The Python interpreter has a number of functions and types built into it that are always available. They are listed here in alphabetical order.

Built-in Functions				
abs()	delattr()	hash()	memoryview()	set()
all()	dict()	help()	min()	setattr()
any()	dir()	hex()	next()	slice()
ascii()	divmod()	id()	object()	sorted()
bin()	enumerate()	input()	oct()	staticmethod()
bool()	eval()	int()	open()	str()
breakpoint()	exec()	isinstance()	ord()	sum()
bytearray()	filter()	issubclass()	pow()	super()
bytes()	float()	iter()	print()	tuple()
callable()	format()	len()	property()	type()
chr()	frozenset()	list()	range()	vars()
classmethod()	getattr()	locals()	repr()	zip()
compile()	globals()	map()	reversed()	__import__()
complex()	hasattr()	max()	round()	

https://www.w3schools.com/python/ref_func_abs.asp

Function	Description
abs()	Returns the absolute value of a number print(abs(-1)) Output: 1
all()	Returns True if all items in an iterable object are true Return `True` if all elements of the *iterable* are true (or if the iterable is empty). Equivalent to: lst=[10,20.5,"abc",None] print(all(lst)) Output: False
any()	Returns True if any item in an iterable object is true lst=[10,20.5,"abc",None]

	print(any(lst)) Output: True
ascii()	Returns a readable version of an object. Replaces none-ascii characters with escape character x = ascii("**My name is St å le**") print(x) output 'My name is St \xe5 le' --------- print(ascii('PythØn')) Output: Pyth\xd8n
bin()	Returns the binary version of a number print(bin(1)) print(bin(72)) output

	ob1 ob1001000
bool()	Returns the boolean value of the specified object print(bool(0)) print(bool(1)) print(bool(**None**)) print(bool(**False**)) print(bool("**Lin**")) output False True False False True ---------- print(bool(o)) print(bool("bas"))

	Output: False True
bytearray()	Returns an array of bytes print(bytearray(0)) print(bytearray(1)) output bytearray(b'') bytearray(b'\x00') Note:There is no bytesarray () for negative values print(bytearray(-1)) output ValueError: negative count
bytes()	Returns a bytes object

	print(bytes(0)) print(bytes(1)) print(bytes(5)) output b'' b'\x00' b'\x00\x00\x00\x00\x00' Note:Bytes is onlyh for encoding characters print(bytes('A')) output TypeError: string argument without an encoding
callable()	Returns True if the specified object is callable, otherwise False print("Is str callable? ", callable(str)) # str class print("Is len callable? ", callable(len)) # len function print("Is list callable? ", callable(list)) # list class num=10 print("Is variable callable? ", callable(num)) output Is str callable? True Is len callable? True

	Is list callable? True
	Is variable callable? False
	
	The callable(), method works with user-defined classes and functions, as shown below.
	
	`class student:`
	`  def greet(self):`
	`  print("Hello there")`
	
	`std = student()`
	`print("Is student class callable? ",callable(student))`
	`print("Is student.greet() callable? ",callable(std.greet))`
	`print("Is student instance callable? ",callable(std))`
	output
	
	Is student class callable? True
	
	Is student.greet() callable? True
	
	Is student instance callable? False

chr()	Returns a character from the specified Unicode code. print(chr(66))

	Output: B
classmethod()	Converts a method into a class method
compile()	Returns the specified source as an object, ready to be executed
complex()	Returns a complex number cnum=complex(5,6) print(cnum) Output: 5+6j
delattr()	Deletes the specified attribute (property or method) from the specified object
dict()	Returns a dictionary (Array) numdict = dict(I='one', II='two', III='three') print(numdict) output

	{'I': 'one', 'II': 'two', 'III': 'three'}

dir()	Returns a list of the specified object's properties and methods
	`print(dir())`
	`print("===========")`
	`print(dir(int))`
	
	output
	['__annotations__', '__builtins__', '__cached__', '__doc__', '__file__', '__loader__', '__name__', '__package__', '__spec__']
	==========
	['__abs__', '__add__', '__and__', '__bool__', '__ceil__', '__class__', '__delattr__', '__dir__', '__divmod__', '__doc__', '__eq__', '__float__', '__floor__', '__floordiv__', '__format__', '__ge__', '__getattribute__', '__getnewargs__', '__gt__', '__hash__', '__index__', '__init__', '__init_subclass__', '__int__', '__invert__', '__le__', '__lshift__', '__lt__', '__mod__', '__mul__', '__ne__', '__neg__', '__new__', '__or__', '__pos__', '__pow__', '__radd__', '__rand__', '__rdivmod__', '__reduce__', '__reduce_ex__', '__repr__', '__rfloordiv__', '__rlshift__', '__rmod__', '__rmul__',

	'__ror__', '__round__', '__rpow__', '__rrshift__', '__rshift__', '__rsub__', '__rtruediv__', '__rxor__', '__setattr__', '__sizeof__', '__str__', '__sub__', '__subclasshook__', '__truediv__', '__trunc__', '__xor__', 'as_integer_ratio', 'bit_count', 'bit_length', 'conjugate', 'denominator', 'from_bytes', 'imag', 'numerator', 'real', 'to_bytes']
divmod()	Returns the quotient and the remainder when argument1 is divided by argument2 print(divmod(6,2)) print(divmod(8,3)) print(divmod(7,2)) print(divmod(3,19)) output (3, 0) (2, 2) (3, 1) (0, 3)
enumerate()	Takes a collection (e.g. a tuple) and returns it as an enumerate object

	cities = ['Delhi','Chicago','New York'] for item in enumerate(cities): print(item) Output: (0,"Delhi") (1,"Chicago") (2,"New York")
eval()	Evaluates and executes an expression
exec()	Executes the specified code (or object)
filter()	Use a filter function to exclude items in an iterable object
float()	Returns a floating point number print(float(10)) Output: 10.0
format()	Formats a specified value

frozenset()	Returns a frozenset object
getattr()	Returns the value of the specified attribute (property or method)
globals()	Returns the current global symbol table as a dictionary
hasattr()	Returns True if the specified object has the specified attribute (property/method)
hash()	Returns the hash value of a specified object
help()	Executes the built-in help system
hex()	Converts a number into a hexadecimal value
id()	Returns the id of an object print(id(10)) Output: 157594035292
input()	Allowing user input
int()	Returns an integer number

isinstance()	Returns True if a specified object is an instance of a specified object
issubclass()	Returns True if a specified class is a subclass of a specified object
iter()	Returns an iterator object
len()	Returns the length of an object
list()	Returns a list
locals()	Returns an updated dictionary of the current local symbol table locals() function in Python returns the dictionary of current local symbol table. Symbol table: It is a data structure created by compiler for which is used to store all information needed to execute a program. ... Unlike from globals() this function can not modify the data of local symbol table. https://www.geeksforgeeks.org/python-locals-function/
map()	Returns the specified iterator with the specified function applied to each item

max()	Returns the largest item in an iterable marks = [45,78,34] a = max(marks) print(a) output 78
memoryview()	Returns a memory view object
min()	Returns the smallest item in an iterable
next()	Returns the next item in an iterable
object()	Returns a new object
oct()	Converts a number into an octal
open()	Opens a file and returns a file object
ord()	Convert an integer representing the Unicode of the specified character
pow()	Returns the value of x to the power of y
print()	Prints to the standard output device

property()	Gets, sets, deletes a property
range()	Returns a sequence of numbers, starting from 0 and increments by 1 (by default)
repr()	Returns a readable version of an object
reversed()	Returns a reversed iterator
round()	Rounds a numbers
set()	Returns a new set object
setattr()	Sets an attribute (property/method) of an object
slice()	Returns a slice object
sorted()	Returns a sorted list
staticmethod()	Converts a method into a static method
str()	Returns a string object
sum()	Sums the items of an iterator
super()	Returns an object that represents the parent class

tuple()	Returns a tuple
type()	Returns the type of an object
vars()	Returns the __dict__ property of an object
zip()	Returns an iterator, from two or more iterators

TASK TO DSIT - TECH MEMBERS

- Create code for each builtin functions
- Task is assigned to
  - Names here :Mythili, Revathi, Sivapriya

9-User defined functions

Python lets us group a sequence of statements into a single entity, called a function. A Python function may or may not have a name.

1. This Python Function help divide a program into modules. This makes the code easier to manage, debug, and scale.

2. It implements code reuse. Every time you need to execute a sequence of statements, all you need to do is to call the function.
3. This Python Function allow us to change functionality easily, and different programmers can work on different functions.

```
def add_Fucntion(a,b):
    addResult = a + b
    subResult = a * b
    multiResult = a * b

    return addResult,subResult,multiResult

result = add_Fucntion(10,2)
print(result)
```

---

10 Function with arbitrary keyword arguments.

1. * args
2. ** kwargs (name and value pair)

11High Order Functions (MRF)

12 Anonyms Functions / Lambda Functions

13Recursion functions