In [9]:
```
def greet(): #function defination
    print('good morning team')
```

In [10]:
```
def greet(): #function defination
    print('good morning team')
greet() #function calling
#without function calling the function will not work
```

```
good morning team
```

In [11]:
```
def greet():
    print('hello')
    print('good morning')
```

In [12]:
```
def greet():
    print('hello')
    print('good morning')
greet()
```

```
hello
good morning
```

In [13]:
```
def greet():
    print('hello')
    print('good morning')
greet()

def greet():
    print('hello')
    print('good morning')
greet()

def greet():
    print('hello')
    print('good morning')
greet()
```

```
hello
good morning
hello
good morning
hello
good morning
```

In [14]:
```
def greet():
    print('hello good morning boss')
greet()
```

```
hello good morning boss
```

In [15]:
```
def greet():
    print('hello good morning boss')
greet()
greet()
greet()
greet()
```

```
hello good morning boss
hello good morning boss
hello good morning boss
hello good morning boss
```

In [16]:
```
def add(x,y):
    c = x + y
    print(c)
add(5,6,7,8)
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
Cell In[16], line 4
      2     c = x + y
      3     print(c)
----> 4 add(5,6,7,8)

TypeError: add() takes 2 positional arguments but 4 were given
```

In [17]:
```
def add(x,y):
    c = x + y
    print(c)
add(5,6)
```

```
11
```

In [18]:
```
def add(x,y,z):
    c = x + y + d + m
    print(c)
add(1,2,3)
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[18], line 4
      2     c = x + y + d + m
      3     print(c)
----> 4 add(1,2,3)

Cell In[18], line 2, in add(x, y, z)
      1 def add(x,y,z):
----> 2     c = x + y + d + m
      3     print(c)

NameError: name 'd' is not defined
```

In [19]:
```
def add(x,y,z):
    c = x + y + x + m
    print(c)
add(1,2,3)
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[19], line 4
      2     c = x + y + x + m
      3     print(c)
----> 4 add(1,2,3)

Cell In[19], line 2, in add(x, y, z)
      1 def add(x,y,z):
----> 2     c = x + y + x + m
      3     print(c)

NameError: name 'm' is not defined
```

In [20]:
```
def add(x,y,z,m):
    c = x + y + x + m
    print(c)
add(1,2,3,6)
```

```
10
```

In [21]:
```
def greet():
    print('hello')
    print('good morning')
greet()
```

```
hello
good morning
```

In [22]:
```
def add(x,y):
    c = x + y
    print(c)
add(5,6)
```

```
11
```

In [23]:
```
def greet():
    print('hello')
    print('good morning')
greet()

def add(x,y):
    c = x + y
    print(c)
add(5,6)
```

```
hello
good morning
11
```

In [24]:
```
def greet():
    print('hello')
    print('good morning')
def add(x,y):
    c = x + y
    print(c)
greet()
add(5,6)
#good practice is to write function one side and func calling another side
```

```
hello
good morning
11
```

In [25]:
```python
def greet():
    print('hello')
    print('good morning')
def add(x,y):
    c = x + y
    print(c)
def sub(x,y):
    d = x - y
    print(d)

greet()
add(4,6)
sub(10,4)
```

```
hello
good morning
10
6
```

In [26]:
```python
def add_sub(x,y):
    c = x+y
    d = x-y
    return c,d #best pratice to use return instead of print()
add_sub(10,8)
```

Out[26]: (18, 2)

In [27]:
```python
def add_sub(x,y):
    c = x+y
    d = x-y
    return c,d

result = add_sub(6,4)

print(result)
```

```
(10, 2)
```

In [28]:
```python
def add_sub(x,y):
    c = x+y
    d = x-y
    return c,d

result1,result2 = add_sub(6,4)
print(result1,result2)
```

```
10 2
```

In [29]:
```python
def add(x,y):
    c = x+y
    print(c)
add(5,6)
```

```
11
```

Formal Argument & Actual Argument

In [30]:
```
def person(name, age):
    print(name)
    print(age)
person('nit',23,34)
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
Cell In[30], line 4
      2     print(name)
      3     print(age)
----> 4 person(     ,23,34)

TypeError: person() takes 2 positional arguments but 3 were given
```

In [31]:
```
def person(name, age): #Formal Argument
    print(name)
    print(age)
person('nit',23) #Actual Argument
```

```
nit
23
```

In [32]:
```
def person(name, age):
    print(name)
    print(age)
person(23,'nit') #here 23 assigned to name,and 'nit' is assign to age
```

```
23
nit
```

In [33]:
```
def person(name, age):
    print(name)
    print(age+1) #here we try to addition with string
person(23,'nit') #which is not possible
```

```
23
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
Cell In[33], line 4
      2     print(name)
      3     print(age+1) #here we try to addition with string
----> 4 person(23,     ) #which is not possible

Cell In[33], line 3, in person(name, age)
      1 def person(name, age):
      2     print(name)
----> 3     print(age+1)

TypeError: can only concatenate str (not "int") to str
```

Keyword Argument

In [34]:
```
def person(name, age):
    print(name)
    print(age+1)
person(age=23, name='nit') # keyword argument
```

```
nit
24
```

In [35]:
```
def person(name, age):
    print(name)
    print(age+1)

person(age1=23, name='nit')
#the error arise because of age1 is defined
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
Cell In[35], line 5
      2     print(name)
      3     print(age+1)
----> 5 person(age1=23, name=     )
      6 #the error arise because of age1 is defined

TypeError: person() got an unexpected keyword argument 'age1'. Did you mean 'ag
e'?
```

In [36]:
```
def person(name, age1):
    print(name)
    print(age1+1)

person(age1=23, name='nit')
```

```
nit
24
```

In [37]:
```
def person(name,age,city):
    print(name)
    print(age+1)
    print(city)

person(age=23, name='nit' , city = 'hyd')
```

```
nit
24
hyd
```

Default Argument

In [38]:
```
def person(name, age=18):
    print(name)
    print(age)

person('nit',23)
# we have pre assigned value to age this called default argument
# if we will not give any value in actual argument
# then system autometically take pre assigned value
```

```
nit
23
```

In [39]:
```
def person(name, age=18):
    print(name)
    print(age)
```

```
person('nit')
#here i didn't give any value for age still it will work
```

```
nit
18
```

Variable Length Argument

In [40]:
```
def sum(a,b):
    c = a+b
    return c
sum(6,4)
```

Out[40]:
```
10
```

In [41]:
```
def sum(a,b):
    c = a+b
    return c
sum(6,4,8,9,5)
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
Cell In[41], line 4
      2     c = a+b
      3     return c
----> 4 sum(6,4,8,9,5)

TypeError: sum() takes 2 positional arguments but 5 were given
```

In [42]:
```
def sum(a,*b):
    c=a+b
    return c
sum(5,6,7,8,9,10)
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
Cell In[42], line 4
      2     c=a+b
      3     return c
----> 4 sum(5,6,7,8,9,10)

Cell In[42], line 2, in sum(a, *b)
      1 def sum(a,*b):
----> 2     c=a+b
      3     return c

TypeError: unsupported operand type(s) for +: 'int' and 'tuple'
```

In [43]:
```
def sum(a,*b):
    print(type(a))
    print(type(b))
sum(5,6,7,8,9,10)
```

```
<class 'int'>
<class 'tuple'>
```

In [44]:
```
def sum(a,*b):
    c=a
    for i in b:
```

```
        c=c+i
    print(c)
sum(5,6,7,8,10,20)
```

```
56
```

In [45]:
```
def sum(a,*b):
    c=a
    for i in b:
        c=c+i
    print(c)
sum(5,6,7,8)
```

```
26
```

In [46]:
```
def person():
    person('Faiz',8,'shaikh',73348)
```

In [47]:
```
def person(name,*data):
    print(name)
    print(data)
person('Faiz',8,'shaikh',73348)
```

```
Faiz
(8, 'shaikh', 73348)
```

In [48]:
```
def person(name,**data):
    print(name)
    print(data)
person('Faiz',age=8,home_place='pune',mob=73348)
```

```
Faiz
{'age': 8, 'home_place': 'pune', 'mob': 73348}
```

Global variable vs Local variable

In [49]:
```
a = 20
print(a)
```

```
20
```

In [50]:
```
a=20
def something():
    b=25
print('in function',b)
print('out function',a)
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[50], line 4
      2 def something():
      3     b=25
----> 4 print('in function',b)
      5 print('out function',a)

NameError: name 'b' is not defined
```

In [51]:
```
a=20
def something():
```

```
    b=25
    print('in function',b)
print('out function',a)
```

```
out function 20
```

In [52]:
```
a=20
def something():
    a=25
print('in function',a)
print('out function',a)
```

```
in function 20
out function 20
```

In [53]:
```
a=20 #global var
def something():
    a=25 #local var
    print('in function',a)
something()
print('out function',a)
```

```
in function 25
out function 20
```

In [54]:
```
# if i want to define global var inside a function
a=20
def something():
    global a
    b=25
    print('in function',b)
    print('global variable',a)
something()
print('out function',a)
```

```
in function 25
global variable 20
out function 20
```

In [55]:
```
x=15 #global variable
def update_x(): #declare that we are using the global variable x
    global x #modify the global variable
    x += 10
update_x()
print(x)
```

```
25
```

In [56]:
```
x=15
def update_x():
    globals()['x']+=10 #access and modify the global variable
update_x()
print(x)
```

```
25
```

In [57]:
```
import keyword
keyword.kwlist
```

Out[57]:
```
['False',
 'None',
 'True',
 'and',
 'as',
 'assert',
 'async',
 'await',
 'break',
 'class',
 'continue',
 'def',
 'del',
 'elif',
 'else',
 'except',
 'finally',
 'for',
 'from',
 'global',
 'if',
 'import',
 'in',
 'is',
 'lambda',
 'nonlocal',
 'not',
 'or',
 'pass',
 'raise',
 'return',
 'try',
 'while',
 'with',
 'yield']
```

In [58]:
```
def count(lst):
    lst=[1,2,3,4,5,6,7,8]
    lst
```

In [59]:
```
lst=[1,2,3,4,5,6,7,8]
lst
```

Out[59]:
```
[1, 2, 3, 4, 5, 6, 7, 8]
```

In [60]:
```
def count(lst):
    lst=[1,2,3,4,5,6,7,8]
    return lst

count(lst)
```

Out[60]:
```
[1, 2, 3, 4, 5, 6, 7, 8]
```

In [61]:
```
def count(lst):
    even=0
    odd=0
    for i in lst:
        if i%2 == 0:
            even += 1
```

```
        else:
            odd += 1
    return even,odd
lst=[1,2,3,4,5,6,7]
even,odd=count(lst)

print(even)
print(odd)
```

```
3
4
```

In [62]:
```
def count(lst):
    even=0
    odd=0
    for i in lst:
        if i%2 == 0:
            even += 1
        else:
            odd += 1
    return even,odd
lst=[1,2,3,4,5,6,7]
even,odd=count(lst)
print("even number:{} and odd number:{}".format(even,odd))
```

```
even number:3 and odd number:4
```

In [63]:
```
def fib(n):
    a=0
    b=1
    print(a)
    print(b)
    for i in range(0,n):
        c=a+b
        a=b
        b=c
        print(c)
fib(10)
```

```
0
1
1
2
3
5
8
13
21
34
55
89
```

In [64]:
```
def wish():
    print('hello')
    print('hi')
wish()
```

```
hello
hi
```

In [65]:
```
# recursion
def wish():
```

```
    print('hello')
    print('hi')
    wish()
wish()
```

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---------------------------------------------------------------------------
RecursionError                            Traceback (most recent call last)
Cell In[65], line 6
      4     print('hi')
      5     wish()
----> 6 wish()

Cell In[65], line 5, in wish()
      3 print('hello')
      4 print('hi')
----> 5 wish()

Cell In[65], line 5, in wish()
      3 print('hello')
      4 print('hi')
----> 5 wish()

    [... skipping similar frames: wish at line 5 (2971 times)]

Cell In[65], line 5, in wish()
      3 print('hello')
      4 print('hi')
----> 5 wish()

Cell In[65], line 3, in wish()
      2 def wish():
----> 3     print(       )
      4     print('hi')
      5     wish()

File ~\AppData\Roaming\Python\Python313\site-packages\IPython\core\interactiveshe
ll.py:3056, in InteractiveShell._tee.<locals>.write(data, *args, **kwargs)
   3054 if not data:
   3055     return result
-> 3056 execution_count = self.execution_count
   3057 output_stream = None
   3058 outputs_by_counter = self.history_manager.outputs

File ~\AppData\Roaming\Python\Python313\site-packages\traitlets\traitlets.py:687,
in TraitType.__get__(self, obj, cls)
    685     return self
    686 else:
--> 687     return t.cast(G, self.get(obj, cls))

File ~\AppData\Roaming\Python\Python313\site-packages\traitlets\traitlets.py:666,
in TraitType.get(self, obj, cls)
    664     raise TraitError("Unexpected error in TraitType: default value not se
t properly") from e
    665 else:
--> 666     return t.cast(G, value)

RecursionError: maximum recursion depth exceeded
```

In [66]:
```
import sys
sys.getrecursionlimit()
```

Out[66]: 3000

In [67]:
```
import sys
sys.setrecursionlimit(200)
print(sys.getrecursionlimit())
```

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200
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In [68]:
```
import sys
sys.getrecursionlimit()
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Out[68]:
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200
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In [69]:
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def wish():
    print('hello')
    print('hi')
    wish()
wish()
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---------------------------------------------------------------------------
RecursionError                            Traceback (most recent call last)
Cell In[69], line 5
      3     print('hi')
      4     wish()
----> 5 wish()

Cell In[69], line 4, in wish()
      2 print('hello')
      3 print('hi')
----> 4 wish()

Cell In[69], line 4, in wish()
      2 print('hello')
      3 print('hi')
----> 4 wish()

    [... skipping similar frames: wish at line 4 (171 times)]

Cell In[69], line 4, in wish()
      2 print('hello')
      3 print('hi')
----> 4 wish()

Cell In[69], line 2, in wish()
      1 def wish():
----> 2     print(       )
      3     print('hi')
      4     wish()

File ~\AppData\Roaming\Python\Python313\site-packages\IPython\core\interactiveshe
ll.py:3056, in InteractiveShell._tee.<locals>.write(data, *args, **kwargs)
   3054 if not data:
   3055     return result
-> 3056 execution_count = self.execution_count
   3057 output_stream = None
   3058 outputs_by_counter = self.history_manager.outputs

File ~\AppData\Roaming\Python\Python313\site-packages\traitlets\traitlets.py:687,
in TraitType.__get__(self, obj, cls)
    685     return self
    686 else:
--> 687     return t.cast(G, self.get(obj, cls))

File ~\AppData\Roaming\Python\Python313\site-packages\traitlets\traitlets.py:666,
in TraitType.get(self, obj, cls)
    664     raise TraitError("Unexpected error in TraitType: default value not se
t properly") from e
    665 else:
--> 666     return t.cast(G, value)

RecursionError: maximum recursion depth exceeded
```

In [70]:
```python
import sys
sys.setrecursionlimit(150)
print(sys.getrecursionlimit())

i=0

def wish():
```

```
    global i
    i += 1
    print('hello', i)
    wish()
wish()
```

```
150
hello 1
hello 2
hello 3
hello 4
hello 5
hello 6
hello 7
hello 8
hello 9
hello 10
hello 11
hello 12
hello 13
hello 14
hello 15
hello 16
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hello 123
hello 124
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```

```
---------------------------------------------------------------------------
RecursionError                            Traceback (most recent call last)
Cell In[70], line 12
     10     print('hello', i)
     11     wish()
---> 12 wish()

Cell In[70], line 11, in wish()
      9 i += 1
     10 print('hello', i)
---> 11 wish()

Cell In[70], line 11, in wish()
      9 i += 1
     10 print('hello', i)
---> 11 wish()

    [... skipping similar frames: wish at line 11 (121 times)]

Cell In[70], line 11, in wish()
      9 i += 1
     10 print('hello', i)
---> 11 wish()

Cell In[70], line 10, in wish()
      8 global i
      9 i += 1
---> 10 print(        , i)
     11 wish()

File ~\AppData\Roaming\Python\Python313\site-packages\IPython\core\interactiveshe
ll.py:3056, in InteractiveShell._tee.<locals>.write(data, *args, **kwargs)
   3054 if not data:
   3055     return result
-> 3056 execution_count = self.execution_count
   3057 output_stream = None
   3058 outputs_by_counter = self.history_manager.outputs

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in TraitType.get(self, obj, cls)
    664     raise TraitError("Unexpected error in TraitType: default value not se
t properly") from e
    665 else:
--> 666     return t.cast(G, value)

RecursionError: maximum recursion depth exceeded
```

Factorial using Recursion

In [71]:
```
def fact(n):
    if n==0:
        return 1
    return n * fact(n-1)

result = fact(5)

result
```

Out[71]: 120

Ananoymous Function | LAMBDA

In [72]:
```
def square(a):
    return a * a

square(5)
```

Out[72]: 25

In [73]:
```
def square(a):
    return a * a

result = square(5)
print(result)
```

```
25
```

In [74]:
```
f = lambda a : a * a
result = f(5)
result
```

Out[74]: 25

In [75]:
```
f = lambda a, b : a+b
f1 = lambda a, b : a-b

result = f(1,4)
result1 = f1(4,1)

print(result)
print(result1)
```

```
5
3
```

In [76]:
```
f = lambda a, b : a+b
f1 = lambda a, b : a-b
f2 = lambda a, b : a*b

result = f(1,4)
result1 = f1(4,1)
result2 = f2(4,1)
```

```
print(result)
print(result1)
print(result2)
```

```
5
3
4
```

In [77]:
```
f = lambda a, b : a+b
f1 = lambda a, b : a-b

result = f(2,6)
result1 = f1(2,6)

print(result)
print(result1)
```

```
8
-4
```

In [78]:
```
import keyword
keyword.kwlist
```

Out[78]:
```
['False',
 'None',
 'True',
 'and',
 'as',
 'assert',
 'async',
 'await',
 'break',
 'class',
 'continue',
 'def',
 'del',
 'elif',
 'else',
 'except',
 'finally',
 'for',
 'from',
 'global',
 'if',
 'import',
 'in',
 'is',
 'lambda',
 'nonlocal',
 'not',
 'or',
 'pass',
 'raise',
 'return',
 'try',
 'while',
 'with',
 'yield']
```

In [79]:
```
def is_even(n):
    return n % 2 == 0

nums = [1,3,2,5,6,4,8,7,9]

evens = list(filter(is_even, nums))
print(evens)
```

```
[2, 6, 4, 8]
```

In [80]:
```
def is_odd(n):
    return n % 2 != 0

nums = [1,3,2,5,6,4,8,7,9]

odds = list(filter(is_odd, nums))
print(odds)
```

```
[1, 3, 5, 7, 9]
```

In [82]:
```
nums = [3,2,5,8,6,4,5,9]

evens = list(filter(lambda n : n%2 == 0, nums))

print(evens)
```

```
[2, 8, 6, 4]
```

In [83]:
```
nums = [3,2,5,8,6,4,5,9]

odd = list(filter(lambda n : n%2 != 0, nums))
print(odd)
```

```
[3, 5, 5, 9]
```

In [84]:
```
nums = [2,3,4,8,10,25,50,80,137,150]

evens = list(filter(lambda n : n%2 == 0, nums))
odd = list(filter(lambda n : n%2 != 0, nums))

print(evens)
print(odd)
```

```
[2, 4, 8, 10, 50, 80, 150]
[3, 25, 137]
```

In [85]:
```
def update(n):
    return n+2

nums = [3,2,6,8,4,6,2,9]

evens = list(filter(is_even, nums))
double = list(map(update, evens))

print(evens)
print(double)
```

```
[2, 6, 8, 4, 6, 2]
[4, 8, 10, 6, 8, 4]
```

In [87]:
```
nums = [3,2,6,8,4,6,2,9]
```

```
evens = list(filter(is_even, nums))
double = list(map(lambda n : n*2, evens))

print(evens)
print(double)
```

```
[2, 6, 8, 4, 6, 2]
[4, 12, 16, 8, 12, 4]
```

In [88]:
```
nums = [3,2,6,8,4,6,2,9]

evens = list(filter(is_even, nums))
double = list(map(lambda n : n*2, evens))
double1 = list(map(lambda n : n+2, evens))
double2 = list(map(lambda n : n-2, evens))

print(evens)
print(double)
print(double1)
print(double2)
```

```
[2, 6, 8, 4, 6, 2]
[4, 12, 16, 8, 12, 4]
[4, 8, 10, 6, 8, 4]
[0, 4, 6, 2, 4, 0]
```

In [ ]:
```

```

In [90]:
```
from functools import reduce

def add_all(a,b):
    return a+b

nums = [3,2,6,8,4,6,2,9]

evens = list(filter(is_even, nums))
double = list(map(lambda n : n*2, evens))

sums = reduce(add_all, double)
sums
print(sums)
```

```
56
```

In [91]:
```
a = [7,8]
print(type(a))
```

```
<class 'list'>
```

In [94]:
```
from functools import reduce

nums = [3,2,6,8,4,6,2,9]

evens = list(filter(is_even, nums))
double = list(map(lambda n : n*2, evens))
sums = reduce(lambda a,b : a+b, double)

print(evens)
print(double)
print(sums)
```

```
[2, 6, 8, 4, 6, 2]
[4, 12, 16, 8, 12, 4]
56
```

In [ ]: