

# Functions

```
In [1]: def greet():  
        print('Hello')  
        print('Good Morning')
```

## Function without argument

```
In [2]: def greet():  
        print('Hello')  
        print('Good Morning')  
        greet()
```

Hello  
Good Morning

```
In [3]: def greet():  
        print("hello")  
        print('good morning')  
        greet()
```

```
In [4]: def greet():  
        print('hello')  
        print('good morning')  
        greet()  
  
def greet():  
    print('hello')  
    print('good morning')  
    greet()
```

hello  
good morning  
hello  
good morning

```
In [5]: def greet():  
        print('hello')  
        print('good morning')  
        greet()  
  
print()  
  
def greet():  
    print('hello')  
    print('good morning')  
    greet()
```

```
hello
good morning
```

```
hello
good morning
```

```
In [6]: greet():
        print('hello')
        print('good morning')
greet()
```

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

```
Cell In[6], line 1
    greet():
      ^
SyntaxError: invalid syntax
```

```
In [7]: def greet():
        print('hello')
        print('good morning')
greet()

print()

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

```
hello
good morning
```

```
hello
good morning
```

```
In [8]: def greet():
        print('hello')
        print('good morning')
greet()
greet()
greet()
```

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

```
In [9]: def greet():
        print('hello')
        print('good morning')
greet()
print()
greet()
```

```
print()
greet()
```

```
hello
good morning
```

```
hello
good morning
```

```
hello
good morning
```

```
In [10]: def greet():
          print('hello')
          print('good morning')
          greet()
          print('*****')
          greet()
          print('*****')
          greet()
```

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

## Function with argument

```
In [11]: def add(x,y):
          c=x+y
          print(c)
          add(5,6)
```

```
11
```

```
In [12]: def add(x,y):
          c=x+y
          return c
          add(5)
```

```
-----
TypeError                                Traceback (most recent call last)
Cell In[12], line 4
      2     c=x+y
      3     return c
----> 4     add(5)

TypeError: add() missing 1 required positional argument: 'y'
```

```
In [13]: def add(x,y):
          c=x+y
          return c
          add(5,6)
```

```
Out[13]: 11
```

```
In [14]: def add(x,y):
          c=x+y
          return c
          add(5,6,7)
```

```
-----
TypeError                                Traceback (most recent call last)
Cell In[14], line 4
      2     c=x+y
      3     return c
----> 4 add(5,6,7)

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

```
In [15]: def add(x,y,z):
          c=x+y
          return c
          add(5,6,7)
```

Out[15]: 11

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

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

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

```
In [17]: def add(x,y,z):
          c=x+y+z+m
          return c
          add(5,6,7)
```

```
-----
NameError                                Traceback (most recent call last)
Cell In[17], line 4
      2     c=x+y+z+m
      3     return c
----> 4 add(5,6,7)

Cell In[17], line 2, in add(x, y, z)
      1 def add(x,y,z):
----> 2     c=x+y+z+m
      3     return c

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

```
In [18]: def add(x,y,z):
          c=x+y+z
          return c
          add(5,6)
```

```

-----
TypeError                                Traceback (most recent call last)
Cell In[18], line 4
      2     c=x+y+z
      3     return c
----> 4 add(5,6)

TypeError: add() missing 1 required positional argument: 'z'

```

```

In [19]: def add(x,y,z,n):
          c=x+y+z+m
          return c
          add(5,6,7,8)

```

```

-----
NameError                                Traceback (most recent call last)
Cell In[19], line 4
      2     c=x+y+z+m
      3     return c
----> 4 add(5,6,7,8)

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

NameError: name 'm' is not defined

```

```

In [20]: def add(x,y,z,n):
          c=x+y+z+n
          return c
          add(5,6,7,8)

```

Out[20]: 26

```

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

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

```

hello  
good morning

Out[21]: 11

```

In [22]: def greet():
          print('hello')
          print('good morning team')

          def add(x,y):
              c=x+y
              return c

          def sub(x,y):
              d=x-y

```

```

    return d

greet()
add(5,6)
sub(5,6)

```

hello  
good morning team

Out[22]: -1

```

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

          def add(x,y):
              c=x+y
              return c

          def sub(x,y):
              d=x-y
              return d

          greet()
          print(add(5,6))
          print(sub(5,6))

```

hello  
good morning team  
11  
-1

```

In [24]: def add_sub(x,y):
          c=x+y
          d=x-y
          return c,d
          add_sub(5,6)

```

Out[24]: (11, -1)

```

In [25]: def add_sub(x,y):
          c=x+y
          d=x-y
          return c
          ,d
          add_sub(5,6)

```

Out[25]: 11

```

In [26]: def add_sub(x,y):
          c=x+y
          d=x-y
          return c,      d
          add_sub(5,6)

```

Out[26]: (11, -1)

```

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

```

```

    return c,d
result=add_sub(4,5)

```

```

In [28]: def add_sub(x,y):
          c=x+y
          d=x-y
          return c,d
          result=add_sub(4,5)
          print(result)

```

(9, -1)

```

In [29]: def add_sub(x,y):
          c=x+y
          d=x-y
          return c,d
          result=add_sub(4,5)
          print(result)
          print(type(result))

```

(9, -1)

<class 'tuple'>

```

In [30]: def add_sub(x,y):
          c=x+y
          d=x-y
          return c,d
          result, result1=add_sub(4,5)
          print(result)
          print(result1)
          print(type(result))

```

9

-1

<class 'int'>

```

In [31]: def add_sub(x,y):
          c=x+y
          d=x-y
          return c,d
          result, result1=add_sub(4,5)
          print(result)
          print(result1)
          print(type(result))
          print(type(result1))

```

9

-1

<class 'int'>

<class 'int'>

```

In [32]: def add_sub_mul(x,y):
          c=x+y
          d=x-y
          e=x*y
          return c,d,e
          add,sub,mul=add_sub_mul(4,5)
          add
          sub
          mul

```

Out[32]: 20

```
In [33]: def add_sub_mul(x,y):  
         c=x+y  
         d=x-y  
         e=x*y  
         return c,d,e  
add_sub_mul(4,5)
```

Out[33]: (9, -1, 20)

```
In [34]: def add_sub_mul(x,y):  
         c=x+y  
         d=x-y  
         e=x*y  
         return c,d,e  
print(add_sub_mul(4,5))  
print(type(add_sub_mul))
```

(9, -1, 20)  
<class 'function'>

## Update

```
In [35]: def update():  
         x=8  
         print(x)  
update()
```

8

```
In [36]: def update():  
         x=8  
         return x  
update()
```

Out[36]: 8

```
In [37]: def update(c):  
         x=2  
         return x  
update(4)
```

Out[37]: 2

```
In [38]: def update():  
         x=8  
         return x  
update(8)
```



```
-----
TypeError                                Traceback (most recent call last)
Cell In[38], line 4
      2     x=8
      3     return x
----> 4 update(8)

TypeError: update() takes 0 positional arguments but 1 was given
```

```
In [39]: def update(x):
          x=8
          return x
          update(100)
```

Out[39]: 8

```
In [40]: def update(x):
          x=8
          return x
          a=15
          update(a)
          print(a)
```

15

```
In [41]: def update(x):
          x=8
          return x
          a=15
          update(a)
```

Out[41]: 8

```
In [42]: def update(x):
          x=8
          return x
          a=15
          print(a)
```

15

```
In [43]: def update(x):
          x=8
          return x
          a=15
          update(a)
          print(a)
```

15

```
In [44]: def add(x,y):
          c=x+y+z
          return c
          add(5,6)
```

```

-----
NameError                                Traceback (most recent call last)
Cell In[44], line 4
      2     c=x+y+z
      3     return c
----> 4 add(5,6)

Cell In[44], line 2, in add(x, y)
      1 def add(x,y):
----> 2     c=x+y+z
      3     return c

NameError: name 'z' is not defined

```

## Positional argument

## pass list to function

```

In [45]: 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]
          even,odd=count(lst)
          print(even)
          print(odd)

```

2  
3

```

In [46]: def count(lst):
          even=0
          odd=0
          for i in lst:
              if i%2==0:
                  even+=1
              else:
                  odd+=1
          return even,odd
          lst=[1,2,3,4,5,6,7,8,9,10,11,12,13]
          even,odd=count(lst)
          print("Even Number:{} and odd Number :{}".format(even,odd))

```

Even Number:6 and odd Number :7

## Fibonacci Sequence

```

In [47]: def fib(n):
          print(0)

```

```
    print(1)
fib(0)
```

0  
1

```
In [48]: def fib(n):
          print(0)
          print(1)
          fib(1)
```

0  
1

```
In [49]: def fib(n):
          print(0)
          print(1)
          fib(2)
```

0  
1

```
In [50]: def fib(n):
          print(0)
          print(1)
          fib(3)
```

0  
1

```
In [51]: def fib(n):
          print(0)
          print(1)
          print(1)
          print(2)
          print(3)
          print(5)
          fib(0)
```

0  
1  
1  
2  
3  
5

```
In [52]: 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(5)
```

0  
1  
1  
2  
3  
5  
8

```
In [53]: 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(5)
```

0  
1  
1  
2  
3  
5  
8

```
In [54]: def fib(n):
          for i in range(0,n):
              c=a+b
              a=b
              b=c
              print(c)

          fib(5)
```

-----  
**UnboundLocalError** Traceback (most recent call last)

Cell In[54], line 7

```
5         b=c
6         print(c)
----> 7 fib(5)
```

Cell In[54], line 3, in fib(n)

```
1 def fib(n):
2     for i in range(0,n):
----> 3         c=a+b
4         a=b
5         b=c
```

**UnboundLocalError**: cannot access local variable 'a' where it is not associated with a value

```
In [55]: def fib():
          a=0
          b=1
          for i in range(0,n):
              c=a+b
              a=b
              b=c
```

```
print(c)
fib()
```

```
-----
NameError                                Traceback (most recent call last)
Cell In[55], line 9
      7         b=c
      8         print(c)
----> 9     fib()

Cell In[55], line 4, in fib()
      2     a=0
      3     b=1
----> 4     for i in range(0,n):
      5         c=a+b
      6         a=b

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

```
In [56]: def fib(n):
          a=0
          b=1
          for i in range(0,n):
              c=a+b
              a=b
              b=c
              print(c)
          fib(5)
```

```
1
2
3
5
8
```

```
In [57]: 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(5)
```

```
0
1
1
2
3
5
8
```

```
In [58]: def fib(n):
          a,b=0,1
          if n==1:
              print(a)
          else:
              print(a)
```

```

        print(b)
        for i in range(2,n):
            c=a+b
            a=b
            b=c
            print(c)
fib(2)

```

0

1

```

In [59]: 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(2)

```

0

1

1

2

```

In [60]: def fib(n):
        a=0
        b=1
        for i in range(0,n):
            c=a+b
            a=b
            b=c
            print(c)
fib(2)

```

1

2

## Factorial of a Number in Python

```

In [61]: def fact(n):
        f=1
        for i in range(1,n+1):
            f=f*i
        return f
x=4
result=fact(x)
print(result)

```

24

```

In [62]: def fact(n):
        f=1
        for i in range(1,n+1):
            f=f*i
        return f
x=3

```

```
result=fact(x)
print(result)
```

6

## Recursion Function Calling Itself

```
In [63]: def wish():
          print('hello')
          wish()
```

hello

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

hello

hello

```
In [65]: import sys
          sys.getrecursionlimit()
```

Out[65]: 3000

```
In [66]: i=0
          def wish():
              global i
              i+=1
              print('hello',i)
              wish()
          wish()
```

hello 1  
hello 2  
hello 3  
hello 4  
hello 5  
hello 6  
hello 7  
hello 8  
hello 9  
hello 10  
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hello 12  
hello 13  
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RecursionError                                Traceback (most recent call last)
Cell In[66], line 7
      5     print('hello',i)
      6     wish()
----> 7     wish()

Cell In[66], line 6, in wish()
      4     i+=1
      5     print('hello',i)
----> 6     wish()

Cell In[66], line 6, in wish()
      4     i+=1
      5     print('hello',i)
----> 6     wish()

[... skipping similar frames: wish at line 6 (2972 times)]

Cell In[66], line 6, in wish()
      4     i+=1
      5     print('hello',i)
----> 6     wish()

Cell In[66], line 5, in wish()
      3     global i
      4     i+=1
----> 5     print('hello',i)
      6     wish()

File ~\AppData\Roaming\Python\Python313\site-packages\ipykernel\iostream.py:664,
in OutputStream.write(self, string)
    655 def write(self, string: str) -> Optional[int]: # type:ignore[override]
    656     """Write to current stream after encoding if necessary
    657
    658     Returns
    659     (...)
    662
    663     """
--> 664     parent = self.parent_header
    665     if not isinstance(string, str):
    666         msg = f"write() argument must be str, not {type(string)}" # typ
e:ignore[unreachable]

RecursionError: maximum recursion depth exceeded

```

```

In [ ]: import sys
        sys.setrecursionlimit(150)
        print(sys.getrecursionlimit())
        i=0
        def wish():
            global i
            i+=1
            print('hello',i)
            wish()
        wish()

```

```

In [ ]: import sys
        sys.setrecursionlimit(150)

```

```
print(sys.getrecursionlimit())

i=0
def wish():
    global i
    i+=1
    print('hello',i)
    wish()
wish()
```

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

```
In [67]: def wish():
        print('hello')
        wish()
```

```
In [68]: def wish():
        print('hello')
        wish()
```

hello

```
In [69]: def wish():
        print('hello')
        wish()
        wish()
```

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[illegible]

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[illegible]

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[illegible]

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[illegible]

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[illegible]



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[illegible]

[illegible]

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[illegible]

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[illegible]

[illegible]

[illegible]

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[illegible]

[illegible]

[illegible]

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[illegible]

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[illegible]

114/180

[illegible]

[illegible]

[illegible]

```

-----
RecursionError                                Traceback (most recent call last)
Cell In[69], line 4
      2     print('hello')
      3     wish()
----> 4     wish()

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

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

[... skipping similar frames: wish at line 3 (2972 times)]

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

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

File ~\AppData\Roaming\Python\Python313\site-packages\ipykernel\iostream.py:664,
in OutputStream.write(self, string)
    655 def write(self, string: str) -> Optional[int]: # type:ignore[override]
    656     """Write to current stream after encoding if necessary
    657
    658     Returns
    659     (...)
    662
    663     """
--> 664     parent = self.parent_header
    665     if not isinstance(string, str):
    666         msg = f"write() argument must be str, not {type(string)}" # typ
    667         e:ignore[unreachable]

RecursionError: maximum recursion depth exceeded

```

```

In [70]: def wish():
          i=0
          i+=1
          print('hello',i)
          wish()
          wish()

```

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[illegible]



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[illegible]

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[illegible]

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[illegible]

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[illegible]

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[illegible]

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[illegible]

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[illegible]

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[illegible]



[illegible]

[illegible]

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[illegible]

[illegible]



```

-----
RecursionError                                Traceback (most recent call last)
Cell In[70], line 6
      4     print('hello',i)
      5     wish()
----> 6     wish()

Cell In[70], line 5, in wish()
      3 i+=1
      4 print('hello',i)
----> 5     wish()

Cell In[70], line 5, in wish()
      3 i+=1
      4 print('hello',i)
----> 5     wish()

[... skipping similar frames: wish at line 5 (2972 times)]

Cell In[70], line 5, in wish()
      3 i+=1
      4 print('hello',i)
----> 5     wish()

Cell In[70], line 4, in wish()
      2 i=0
      3 i+=1
----> 4     print('hello',i)
      5     wish()

File ~\AppData\Roaming\Python\Python313\site-packages\ipykernel\iostream.py:664,
in OutputStream.write(self, string)
    655 def write(self, string: str) -> Optional[int]: # type:ignore[override]
    656     """Write to current stream after encoding if necessary
    657
    658     Returns
    659     (...)
    662
    663     """
--> 664     parent = self.parent_header
    665     if not isinstance(string, str):
    666         msg = f"write() argument must be str, not {type(string)}" # typ
    667         e:ignore[unreachable]

RecursionError: maximum recursion depth exceeded

```

```

In [ ]: i=0
def wish():
    global i
    i+=1
    print('hello',i)
    wish()
wish()

```

```

In [ ]: import sys
print(sys.getrecursionlimit())

```

```

In [ ]: sys.setrecursion(1000)

```

```
In [ ]: sys.setrecursionlimit(1000)
```

```
In [ ]: print(sys.getrecursionlimit())
```

```
In [71]: 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  
hello 17  
hello 18  
hello 19  
hello 20  
hello 21  
hello 22  
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hello 106  
hello 107  
hello 108  
hello 109  
hello 110  
hello 111  
hello 112  
hello 113  
hello 114  
hello 115  
hello 116  
hello 117  
hello 118  
hello 119

```
hello 120
hello 121
hello 122
hello 123
hello 124
hello 125
```

```
-----
RecursionError                                Traceback (most recent call last)
Cell In[71], line 10
      8     print('hello',i)
      9     wish()
--> 10 wish()

Cell In[71], line 9, in wish()
      7 i+=1
      8 print('hello',i)
----> 9 wish()

Cell In[71], line 9, in wish()
      7 i+=1
      8 print('hello',i)
----> 9 wish()

[... skipping similar frames: wish at line 9 (122 times)]

Cell In[71], line 9, in wish()
      7 i+=1
      8 print('hello',i)
----> 9 wish()

Cell In[71], line 8, in wish()
      6 global i
      7 i+=1
----> 8 print('hello',i)
      9 wish()

File ~\AppData\Roaming\Python\Python313\site-packages\ipykernel\iostream.py:664,
in OutputStream.write(self, string)
    655 def write(self, string: str) -> Optional[int]: # type:ignore[override]
    656     """Write to current stream after encoding if necessary
    657
    658     Returns
    659     (...)
    662
    663     """
--> 664     parent = self.parent_header
    665     if not isinstance(string, str):
    666         msg = f"write() argument must be str, not {type(string)}" # typ
    667         e:ignore[unreachable]

RecursionError: maximum recursion depth exceeded
```

## Factorial Using Recursion

```
In [72]: #Recursion is a function calling itself
def fact(n):
    if n==0:
        return 1
```

```
    return n*fact(n-1)
result=fact(4)
result
```

Out[72]: 24

```
In [73]: import sys
sys.getrecursionlimit()
```

Out[73]: 150

```
In [74]: def fact(n):
    if n==0:
        return 1
    return n*fact(n-1)
result=fact(5)
result
```

Out[74]: 120

## Anonymous or lambda function

```
In [75]: #without function name is called -ANONYMOUS FUNCTION OR LAMBDA
def square(a):
    return a*a
result=square(5)
print(result)
```

25

```
In [76]: f=lambda a:a*a
result=f(5)
result
```

Out[76]: 25

```
In [77]: f=lambda a,b:a+b
result=f(1,4)
print(result)
```

5

```
In [78]: f=lambda a,b:a+b
result=f(1,4)
result
```

Out[78]: 5

```
In [79]: f=lambda a,b:a+b,a-b
result=f(1,4)
result
```

```
-----
NameError                                Traceback (most recent call last)
Cell In[79], line 1
----> 1 f=lambda a,b:a+b,a-b
      2 result=f(1,4)
      3 result

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

```
In [80]: f=lambda a,b:a+b,a-b
result=f(1,4)
result1=f(3,2)
print(result)
print(result1)
```

```
-----
NameError                                Traceback (most recent call last)
Cell In[80], line 1
----> 1 f=lambda a,b:a+b,a-b
      2 result=f(1,4)
      3 result1=f(3,2)

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

```
In [81]: f=lambda a,b:a+b
f1=lambda a,b:a-b
result=f(1,4)
result1=f1(2,3)
print(result)
print(result1)
```

```
5
-1
```

```
In [82]: f=lambda a,b:a+b
f1=lambda a,b:a-b
f2=lambda a,b:a*b
result=f(3,2)
result1=f1(3,2)
result2=f2(3,2)
print(result)
print(result1)
print(result2)
```

```
5
1
6
```

## filter()

## map()

## reduce()

```
In [83]: nums=[3,2,6,8,4,6,2,9]
        evens=list(filter(is_even,nums))
```

```
-----
NameError                                Traceback (most recent call last)
Cell In[83], line 2
      1 nums=[3,2,6,8,4,6,2,9]
----> 2 evens=list(filter(is_even,nums))

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

```
In [84]: def is_even(n):
        return n%2==0
        nums=[3,2,6,8,4,6,2,9]
        evens=list(filter(is_even,nums))
        print(evens)
```

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

```
In [85]: def is_odd(n):
        return n%2!=0
        nums=[3,2,6,8,4,6,2,9]
        odd=list(filter(is_odd,nums))
        print(odd)
```

```
[3, 9]
```

```
In [86]: nums=[3,2,6,8,4,6,2,9]
        evens=list(filter(lambda n:n%2==0,nums))
        print(evens)
```

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

```
In [87]: nums=[3,2,6,8,4,6,2,9]
        odds=list(filter(lambda n:n%2!=0))
        print(odds)
```

```
-----
TypeError                                Traceback (most recent call last)
Cell In[87], line 2
      1 nums=[3,2,6,8,4,6,2,9]
----> 2 odds=list(filter(lambda n:n%2!=0))
      3 print(odds)

TypeError: filter expected 2 arguments, got 1
```

```
In [88]: nums=[3,2,4,6,8,4,6,2,9]
        odds=list(filter(lambda n:n%2!=0,nums))
        print(odds)
```

```
[3, 9]
```

```
In [89]: nums=[3,2,6,8,4,6,2,9]
        evens=list(filter(lambda n:n%2==0,nums))
        odds=list(filter(lambda n:n%2!=0,nums))
        print(evens)
        print(odds)
```

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

```
[3, 9]
```



# map()

```
In [90]: 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 [91]: 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, 8, 10, 6, 8, 4]
```

```
In [92]: 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 [93]: nums=[3,2,6,8,4,6,2,9]
         evens=list(filter(is_even,nums))
         double=list(map(lambda n:n*2,evens))
         double_=list(map(lambda n:n+2,double))
         double_1=list(map(lambda n:n-2,double_))
         print(evens)
         print(double)
         print(double_)
         print(double_1)
```

```
[2, 6, 8, 4, 6, 2]
[4, 12, 16, 8, 12, 4]
[6, 14, 18, 10, 14, 6]
[4, 12, 16, 8, 12, 4]
```

```
In [94]: nums=[3,2,6,8,4,6,2,9]
         odds=list(filter(is_odd,nums))
         odd=list(map(lambda n:n%2!=0,odds))
         print(odd)
```

```
[True, True]
```

```
In [95]: nums=[3,2,6,8,4,6,2,9]
         odds=list(filter(is_odd,nums))
         print(odds)
```

```
[3, 9]
```

```
In [96]: from functiontools import reduce
def add_all(a,b):
    return a+b
nums=[3,2,6,8,4,6,2]
evens=list(filter(is_even,nums))
double=list(map(lambda n:n*2,evens))
sums=reduce(add_all,double)
sums
print(sums)
```

```
-----
ModuleNotFoundError                                Traceback (most recent call last)
Cell In[96], line 1
----> 1 from functiontools import reduce
      2 def add_all(a,b):
      3     return a+b

ModuleNotFoundError: No module named 'functiontools'
```

```
In [97]: from functools import reduce
def add_all(a,b):
    return a+b
nums=[3,2,6,8,4,6,2]
evens=list(filter(is_even,nums))
double=list(map(lambda n:n*2,evens))
sums=reduce(add_all,double)
sums
print(sums)
```

56

```
In [98]: a=[7,8]
print(type(a))
```

&lt;class 'list'&gt;

```
In [99]: 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
```

## python decorators

```
In [100... def div(a,b):
              print(a/b)
div(4,2)
```

2.0

```
In [101... def div(a,b):
              print(a//b)
```

```
div(4,2)
```

2

```
In [102... def div(a,b):
              print(a/b)
              div(2,4)
```

0.5

```
In [103... def div(a,b):
              if a<b:
                  a,b=b,a
              print(a/b)
              div(4,2)
```

2.0

```
In [104... def div(a,b):
              print(a/b)
              def div_decorator(func):
                  def inner(a,b):
                      if a<b:
                          a,b=b,a
                      return func(a,b)
                  return inner
              div=div_decorator(div)
              div(2,4)
```

2.0

```
In [105... def my_decorator(func):
              def wrapper():
                  print("Something is happening before the function is called.")
                  #func
                  print("Something is happening after the function is called.")
              return wrapper
              @my_decorator
              def say_hello():
                  print("Hello!")
              say_hello()
```

Something is happening before the function is called.

Something is happening after the function is called.

```
In [106... def my_decorator(func):
              def wrapper():
                  print("Something is happening before the function is called.")
                  func()
                  print("Something is happening after the function is called.")
              return wrapper
              @my_decorator
              def say_hello():
                  print("Hello!")
              say_hello()
```

Something is happening before the function is called.

Hello!

Something is happening after the function is called.

```
In [ ]:
```

In [ ]:

In [ ]: