

```
In [1]: def f(x):
        return x+1

        def g(x):
            return x-1

        f(g(1)+g(2)) + g(f(1)+f(2))
```

Out[1]: 6

```
In [2]: a = [4,3,2,5,6,7]
```

```
In [3]: a[0]
```

Out[3]: 4

```
In [7]: a[1]
```

Out[7]: 3

```
In [8]: a[0] = -17
```

```
In [9]: a
```

Out[9]: [-17, 3, 2, 5, 6, 7]

```
In [5]: b = "Mitsos"
        b[0]
```

Out[5]: 'M'

```
In [6]: b[0] = 'L'
```

```
-----
TypeError                                Traceback (most recent call last)
<ipython-input-6-78ea47601bd4> in <module>
----> 1 b[0] = 'L'

TypeError: 'str' object does not support item assignment
```

```
In [10]: b
```

Out[10]: 'Mitsos'

```
In [11]: len(b)
```

Out[11]: 6

```
In [12]: len(a)
```

Out[12]: 6

```
In [13]: a
```

Out[13]: [-17, 3, 2, 5, 6, 7]

In [14]: `'Thessaloniki'.count('s')`

Out[14]: 2

In [15]: `'Thessaloniki'.count('l')`

Out[15]: 1

In [16]: `'Thessaloniki'.count('q')`

Out[16]: 0

In [17]: `a`

Out[17]: [-17, 3, 2, 5, 6, 7]

In [18]: `a.count(3)`

Out[18]: 1

In [20]: `'Thessaloniki'.index('s')`

Out[20]: 3

In [21]: `a`

Out[21]: [-17, 3, 2, 5, 6, 7]

In [22]: `a.index(6)`

Out[22]: 4

In [23]: `a.count("mitsos")`

Out[23]: 0

In [24]: `a.index(9)`

```
-----
ValueError                                Traceback (most recent call last)
<ipython-input-24-8ab34ac345ab> in <module>
----> 1 a.index(9)

ValueError: 9 is not in list
```

In [25]: `"sadas".index('q')`

```
-----
ValueError                                Traceback (most recent call last)
<ipython-input-25-9ca0a27640d9> in <module>
----> 1 "sadas".index('q')

ValueError: substring not found
```

```
In [27]: 'it' in 'Mitsos'
```

```
Out[27]: True
```

```
In [28]: 'io' in 'Mitsos'
```

```
Out[28]: False
```

```
In [29]: 3 in [3,4,5]
```

```
Out[29]: True
```

```
In [30]: 7 in [3,4,5]
```

```
Out[30]: False
```

```
In [31]: a
```

```
Out[31]: [-17, 3, 2, 5, 6, 7]
```

```
In [32]: a[0]
```

```
Out[32]: -17
```

```
In [33]: a[1]
```

```
Out[33]: 3
```

```
In [34]: a.count(1)
```

```
Out[34]: 0
```

```
In [35]: a
```

```
Out[35]: [-17, 3, 2, 5, 6, 7]
```

```
In [36]: 'abcdefghijklmnop'[2:7:2]
```

```
Out[36]: 'ceg'
```

```
In [37]: a = [1,2,3,4,5,6,7,8,9]
```

```
In [38]: a[2:7:2]
```

```
Out[38]: [3, 5, 7]
```

```
In [39]: a[7:2:-1]
```

```
Out[39]: [8, 7, 6, 5, 4]
```

```
In [40]: a[7:2:-2]
```

```
Out[40]: [8, 6, 4]
```

a

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

a[-1]

9

a[-2]

8

```
a[:4]
```

 $[1, 2, 3, 4]$

a

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

```
a = [1,2,'mitsos', 4,5]
```

```
a = [1,2,'mitsos', 4,5, True, False, None, 3+4j]
```

```
a.index(False)
```

6

```
type(a)
```

list

```
a = [1, 2, 3, [7, 8, 9], True]
```

```
len(a)
```

5

a[3]

[7, 8, 9]

[illegible]

```
len(a)
```

1

```
len([ ])
```

0

In [60]: `a= []`

In [61]: `len(a)`

Out[61]: 0

In [62]: `len('')`

Out[62]: 0

In [63]: `a = [[]]`

In [64]: `len(a)`

Out[64]: 1

In [65]: `a[0]`

Out[65]: `[]`

In [66]: `[1,2, [], 5,6]`

Out[66]: `[1, 2, [], 5, 6]`

In [67]: `if 'mitsos':
 print ('hello')`

hello

In [68]: `if '':
 print ('hello')`

In [69]: `if [1,2,3]:
 print ('hello')`

hello

In [70]: `if []:
 print ('hello')`

In [71]: `a = [6,7,8]`

In [72]: `"mitsos" + "kostas"`

Out[72]: `'mitsoskostas'`

In [73]: `[6,7,8] + [9,10,10]`

Out[73]: `[6, 7, 8, 9, 10, 10]`

In [74]: `"mitsos " * 10`

Out[74]: `'mitsos mitsos mitsos mitsos mitsos mitsos mitsos mitsos mitsos mitsos '`

```
In [83]: [1,2,3] * 5
```

```
Out[83]: [1, 2, 3, 1, 2, 3, 1, 2, 3, 1, 2, 3, 1, 2, 3]
```

```
In [84]: a=[1,2,3]
```

```
In [85]: a = a + [4]
```

```
In [ ]: a = [1,2,3] + [4]
```

```
In [86]: a
```

```
Out[86]: [1, 2, 3, 4]
```

```
In [87]: a = a + [10]
```

```
In [88]: a
```

```
Out[88]: [1, 2, 3, 4, 10]
```

```
In [89]: b = 5
         #b = b + 1
         b += 1
```

```
In [90]: b
```

```
Out[90]: 6
```

```
In [91]: a = [1,2,3]
         #a = a + [4]
         a += [4]
         print (a)

[1, 2, 3, 4]
```

```
In [92]: a = ["mitsos"] + a
         print (a)

['mitsos', 1, 2, 3, 4]
```

```
In [93]: a += [4] # a = a + [4]
```

```
In [94]: a
```

```
Out[94]: ['mitsos', 1, 2, 3, 4, 4]
```

```
In [95]: a.append(10)
```

```
In [96]: a
```

```
Out[96]: ['mitsos', 1, 2, 3, 4, 4, 10]
```

```
In [97]: a
```

```
Out[97]: ['mitsos', 1, 2, 3, 4, 4, 10]
```

```
In [98]: a.append([10,9])
```

```
In [99]: print(a)
```

```
['mitsos', 1, 2, 3, 4, 4, 10, [10, 9]]
```

```
In [100]: a.extend([10,9])
```

```
In [101]: a
```

```
Out[101]: ['mitsos', 1, 2, 3, 4, 4, 10, [10, 9], 10, 9]
```

```
In [102]: # a.append(x)
# a += [x]

# a.extend(x)
# a += x
```

```
In [103]: a = [1,2,3,4,5]
```

```
In [104]: a = ['mitsos'] + a
print (a)
```

```
['mitsos', 1, 2, 3, 4, 5]
```

```
In [105]: a = [1,2,3,4,5]
```

```
In [106]: a
```

```
Out[106]: [1, 2, 3, 4, 5]
```

```
In [107]: a[:2]
```

```
Out[107]: [1, 2]
```

```
In [108]: a[2:]
```

```
Out[108]: [3, 4, 5]
```

```
In [109]: ['Mitsos']
```

```
Out[109]: ['Mitsos']
```

```
In [110]: a = a[:2] + ['Mitsos'] + a[2:]
a
```

```
Out[110]: [1, 2, 'Mitsos', 3, 4, 5]
```

```
In [111]: a = [1,2,3,4,5]
a
```

```
Out[111]: [1, 2, 3, 4, 5]
```

```
In [112... a.insert(2, "mitsos")
print (a)

[1, 2, 'mitsos', 3, 4, 5]
```

```
In [113... a = [1,2,3,4,5]
a.insert(0, 'mitsos')
print (a)

['mitsos', 1, 2, 3, 4, 5]
```

```
In [114... a = [1,2,3,4,5]
a.insert(1000, 'Mitsos')
```

```
In [115... a

Out[115... [1, 2, 3, 4, 5, 'Mitsos']
```

```
In [116... a

Out[116... [1, 2, 3, 4, 5, 'Mitsos']
```

```
In [117... a[:2]

Out[117... [1, 2]
```

```
In [118... a[3:]

Out[118... [4, 5, 'Mitsos']
```

```
In [119... a = a[:2] + a[3:]
a

Out[119... [1, 2, 4, 5, 'Mitsos']
```

```
In [120... a = [1, 2, 3, 4, 5]
print (a)

[1, 2, 3, 4, 5]
```

```
In [121... a[:2] + a[3:]

Out[121... [1, 2, 4, 5]
```

```
In [122... del a[2]
print (a)

[1, 2, 4, 5]
```

```
In [123... b = 3
print (b)

3
```

```
In [124... del b
```

```
In [125... print(b)
```



```
-----
NameError                                Traceback (most recent call last)
<ipython-input-125-67e500defa1b> in <module>
----> 1 print(b)

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

In [126... a

Out[126... [1, 2, 4, 5]

In [127... a[::-1]

Out[127... [5, 4, 2, 1]

In [128... a = [1,2,3,4,5,6,7]

In [129... [1,2,3,4,5,6,7, 5+3,]

Out[129... [1, 2, 3, 4, 5, 6, 7, 8]

In [130...
def f(x):
 return x[2]

f([4,5,6])

Out[130... 6

In [131...
def f(x):
 return x+1

In [132... a=[1,2,3]

In [133... type(f)

Out[133... function

In [134... a.insert(2,f)

In [139... a

Out[139... [1, 2, <function __main__.f(x)>, 3]

In [140... a[2](10)

Out[140... 11

In [136... b=f

In [137... f(3)

Out[137... 4

In [138... b(3)

Out[138...] 4

```
In [141...] def f(a,b):
              return a+b
```

```
In [142...] def g(a,b):
              return a-b
```

```
In [143...] l = [f,g]
```

```
In [144...] l[0](4,5)
```

Out[144...] 9

```
In [145...] l[1](4,5)
```

Out[145...] -1

```
In [146...] a = [5,4,3,6,7,8,9]
```

```
In [147...] sum(a)
```

Out[147...] 42

```
In [148...] min(a)
```

Out[148...] 3

```
In [149...] max(a)
```

Out[149...] 9

```
In [150...] a = [5,4,3,6,7,8,9]
```

```
In [151...] def f(x):
              return x+1
```

```
In [156...] list(map(f,a))
```

Out[156...] [6, 5, 4, 7, 8, 9, 10]

```
In [167...] "Mitsos".find('q')
```

Out[167...] -1

```
In [166...] 'Mitsos'.index('q')
```

```
-----
ValueError                                Traceback (most recent call last)
<ipython-input-166-5ac49b51bd93> in <module>
----> 1 'Mitsos'.index('q')

ValueError: substring not found
```

In [153... `[5,4,3,6,7,8,9] + 1`

```
-----
TypeError                                Traceback (most recent call last)
<ipython-input-153-062de0023e23> in <module>
----> 1 [5,4,3,6,7,8,9] + 1

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

In [170... `def f(a,b):`
 `return a+b`

`def g(a,b):`
 `return a-b`

`l = [f,g]`

`op = '+'`
`op1 = 10`
`op2 = 5`

`l['+-'.index(op)](op1, op2)`

Out[170... 15

In [171... `def f():`
 `print ("mitsos")`

`a = f()`
`print (a)`

mitsos
None

In [172... `print (a)`

None

In [173... `def f():`
 `return "Mitsos"`

`a = f()`

In [174... `print (a)`

Mitsos

In [175... `4`
`5`
`6`
`7`
`8`

Out[175... 8

```
In [178... def f():
              return "mitsos"
            f()

            def g():
              return "kwstas"
            g()
```

Out[178... 'kwstas'

```
In [180... 1
          2
          3
          None
```

```
In [181... print (None)

None
```

```
In [182... a = [1,2,3,4,5,6]
```

```
In [183... def f(x):
              return x/2

            list(map(f,a))
```

Out[183... [0.5, 1.0, 1.5, 2.0, 2.5, 3.0]

```
In [187... a
```

Out[187... [1, 2, 3, 4, 5, 6]

```
In [185... def f(x):
              return x%2==0
```

```
In [186... list(filter(f, a))
```

Out[186... [2, 4, 6]

```
In [188... map(f,a)
```

Out[188... <map at 0x7f833ec4e8b0>

```
In [189... def f(x):
              print ("hello")
              return x/2
```

```
In [190... map(f,a)
```

Out[190... <map at 0x7f833ec4efa0>

```
In [192... list(map(f,a))
```

hello
hello

```
hello
hello
hello
```

Out[192...] [0.5, 1.0, 1.5, 2.0, 2.5, 3.0]

```
In [193...] a = [4,5,3,4,6,7,8,7]
            print(a)
```

```
[4, 5, 3, 4, 6, 7, 8, 7]
```

```
In [199...] a
```

Out[199...] [3, 4, 4, 5, 6, 7, 7, 8]

```
In [195...] sorted(a)
```

Out[195...] [3, 4, 4, 5, 6, 7, 7, 8]

```
In [196...] a
```

Out[196...] [4, 5, 3, 4, 6, 7, 8, 7]

```
In [197...] a.sort()
```

```
In [204...] a
```

Out[204...] [3, 4, 4, 5, 6, 7, 7, 8]

```
In [205...] a = [4,5,3,4,6,7,8,7]
```

```
In [206...] b=sorted(a)
```

```
In [207...] a
```

Out[207...] [4, 5, 3, 4, 6, 7, 8, 7]

```
In [208...] b
```

Out[208...] [3, 4, 4, 5, 6, 7, 7, 8]

```
In [211...] sorted(a, reverse=False)
```

Out[211...] [3, 4, 4, 5, 6, 7, 7, 8]

```
In [212...] sorted(['patras', 'athens', 'heraklion'])
```

Out[212...] ['athens', 'heraklion', 'patras']

```
In [213...] a
```

Out[213...] [4, 5, 3, 4, 6, 7, 8, 7]

```
In [214...] a.sort()
```

In [215...

`a`

Out[215...

`[3, 4, 4, 5, 6, 7, 7, 8]`

In [218...

`a = [4, 5, 3, 4, 6, 7, 8, 7]`
`b=sorted(a)`

In [217...

`a`

Out[217...

`[4, 5, 3, 4, 6, 7, 8, 7]`

In [222...

`a = [4, 5, 3, 4, 6, 7, 8, 7]`
`sorted(a, reverse=True)`

Out[222...

`[8, 7, 7, 6, 5, 4, 4, 3]`

In [223...

`sorted(['patras', 'athens', 'heraklion'])`

Out[223...

`['athens', 'heraklion', 'patras']`

In [224...

`'athens' < 'heraklion'`

Out[224...

`True`

In [225...

`'aaaaaaaaaaaaaaaaaaaaa' < 'b'`

Out[225...

`True`

In [226...

`'a' < 'b'`

Out[226...

`True`

In [227...

`'aa' < 'ab'`

Out[227...

`True`

In [228...

`'aa' < 'aab'`

Out[228...

`True`

In [229...

`5<3`

Out[229...

`False`

In [230...

`[3] < [5]`

Out[230...

`True`

In [231...

`[3,5] < [3,6]`

Out[231...

`True`

```
In [232... [3,5,1,1,1,1,1,1] < [3,6]
```

```
Out[232... True
```

```
In [233... 1 < "mitsos"
```

```
-----
TypeError                                Traceback (most recent call last)
<ipython-input-233-14144e7b0975> in <module>
----> 1 1 < "mitsos"

TypeError: '<' not supported between instances of 'int' and 'str'
```

```
In [234... [5, 1] < [6, "mitsos"]
```

```
Out[234... True
```

```
In [235... [6, 1] < [6, [5, 1] < [6, "mitsos"]]
```

```
-----
TypeError                                Traceback (most recent call last)
<ipython-input-235-3962cd0a0ec3> in <module>
----> 1 [6, 1] < [6, "mitsos"]

TypeError: '<' not supported between instances of 'int' and 'str'
```

```
In [236... [3,5,7] < [3,6,5]
```

```
Out[236... True
```

```
In [237... [3,5] < [3,5,7]
```

```
Out[237... True
```

```
In [238... [3,5] < [3,5]
```

```
Out[238... False
```

```
In [239... 5<5
```

```
Out[239... False
```

```
In [241... 'athens' < 'heraklion'
```

```
Out[241... True
```

```
In [242... [4_000_000, 'athens'] < [200_000, 'heraklion']
```

```
Out[242... False
```

```
In [244... min( [ [4_000_000, 'athens'] , [200_000, 'heraklion'] ] )[1]
```

```
Out[244... 'heraklion'
```

```
In [245... a = [[4_000_000, 'athens'],[200_000, 'heraklion'],[250_000, 'patras']]
```

```
In [246... a = [
    [4_000_000, 'athens'],
    [200_000, 'heraklion'],
    [250_000, 'patras']
]
```

```
In [247... a = [
    [4_000_000, 'athens'],
    [200_000, 'heraklion'],
    [250_000, 'patras'],
]
```

```
In [248... a
```

```
Out[248... [[4000000, 'athens'], [200000, 'heraklion'], [250000, 'patras']]
```

```
In [249... sorted(a)
```

```
Out[249... [[200000, 'heraklion'], [250000, 'patras'], [4000000, 'athens']]
```

```
In [250... sorted(a, reverse=True)
```

```
Out[250... [[4000000, 'athens'], [250000, 'patras'], [200000, 'heraklion']]
```

```
In [251... min(a)
```

```
Out[251... [200000, 'heraklion']
```

```
In [252... max(a)
```

```
Out[252... [4000000, 'athens']
```

```
In [253... a = ['athens', 'heraklion', 'lamia']
```

```
In [254... sorted(a)
```

```
Out[254... ['athens', 'heraklion', 'lamia']
```

```
In [255... def f(x):
    return len(x)
```

```
In [256... sorted(a, key=f)
```

```
Out[256... ['lamia', 'athens', 'heraklion']
```

```
In [258... sorted(a, key=f, reverse=True)
```

```
Out[258... ['heraklion', 'athens', 'lamia']
```

```
In [259... a = [[4000000, 'athens'], [250000, 'patras'], [200000, 'heraklion']]
```

```
In [260... sorted(a)
```


Out[260... [[200000, 'heraklion'], [250000, 'patras'], [4000000, 'athens']]]

In [261... `a = [['athens',4000000,],['patras', 250000,],['heraklion', 200000,],]`

In [262... `a`

Out[262... [['athens', 4000000], ['patras', 250000], ['heraklion', 200000]]

In [263... `sorted(a)`

Out[263... [['athens', 4000000], ['heraklion', 200000], ['patras', 250000]]

In [264... `def f(x):
 return x[1]
sorted(a,key=f)`

Out[264... [['heraklion', 200000], ['patras', 250000], ['athens', 4000000]]

In [265... `min(a, key=f)`

Out[265... ['heraklion', 200000]

In [266... `a`

Out[266... [['athens', 4000000], ['patras', 250000], ['heraklion', 200000]]

In [267... `max(a, key=f)`

Out[267... ['athens', 4000000]

In [269... `max(a, key=f)[0]`

Out[269... 'athens'

In [280... `(sorted(a,key=f)) [len(a)//2]`

Out[280... ['patras', 250000]

In []:

In [271... `a`

Out[271... [['athens', 4000000], ['patras', 250000], ['heraklion', 200000]]

In [272... `sorted(a, key=f)`

Out[272... [['heraklion', 200000], ['patras', 250000], ['athens', 4000000]]

In [273... `b=[4,5,6,7,8,]`

In [279... `b[len(b)//2]`

Out[279... 6

In [278...]

```
-----  
TypeError                                Traceback (most recent call last)  
<ipython-input-278-177ba617805e> in <module>  
----> 1 b[2.5]  
  
TypeError: list indices must be integers or slices, not float
```

In []: