import

In [105]:
```
students = [
    'student_1',
    'student_2',
]

import random

def pick():
    return random.choice(students)
```

In [2]:
```
pick()
```

Out[2]: 'Νίκος'

In [2]:
```
import part1
```

In [3]:
```
part1.f()
```

Out[3]: 42

In [6]:
```
from part1 import f
```

In [7]:
```
f()
```

Out[7]: 42

In [1]:
```
from part1 import f,g
```

In [1]:
```
from part1 import f
```

In [2]:
```
from part1 import g
```

In [3]:
```
import part1
```

In [1]:
```
from part1 import *
```

In [2]:
```
f()
```

Out[2]: 42

In [3]:
```
g()
```

Out[3]: 10

In [4]:
```
def f():
    return 'maria'
```

In [5]:
```
part1.f()
```

Out[5]: 42

In [6]:
```
f()
```

Out[6]:
```
'maria'
```

In [1]:
```
from part1 import f
```

In [2]:
```
f()
```

Out[2]:
```
42
```

In [3]:
```
def f():
    return 'maria'
```

In [4]:
```
f()
```

Out[4]:
```
'maria'
```

In [5]:
```
sum
```

Out[5]:
```
<function sum(iterable, start=0, /)>
```

In [6]:
```
sum([1,2,3])
```

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

In [7]:
```
sum = 'mitsos'
```

In [8]:
```
sum([1,2,3])
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-8-56b33b39430a> in <module>()
----> 1 sum([1,2,3])

TypeError: 'str' object is not callable
```

In [ ]:
```
'mit
```

In [1]:
```
max = min
```

In [2]:
```
max([3,4,5])
```

Out[2]:
```
3
```

In [4]:
```
a=3
```

In [5]:
```
id(a)
```

Out[5]:
```
4486362240
```

In [6]:
```
import antigravity
```

In [7]:
```
from collections import Counter
```

In [8]:
```
Counter('asd;kjfhzsldjhfglskjdfglaskjfhlaskjdfhlakjdfhg')
```

Out[8]:
```
Counter({'a': 4,
         's': 5,
         'd': 5,
         ';': 1,
         'k': 5,
         'j': 6,
         'f': 6,
         'h': 5,
         'z': 1,
         'l': 5,
         'g': 3})
```

In [42]:
```
d = Counter([pick() for x in range(1000)])
```

In [43]:
```
d
```

Out[43]:
```
Counter({'Νίκος': 109,
         'Έλσα': 134,
         'Άρτεμις': 118,
         'Αιμίλιος': 118,
         'Δανάη': 117,
         'Αθανασία': 124,
         'Κλάρα': 134,
         'Πολίνα': 146})
```

In [45]:
```
d['Νίκος']
```

Out[45]:
```
109
```

In [47]:
```
for k,v in d.items():
    print (k,'-->',v)
```

```
Νίκος --> 109
Έλσα --> 134
Άρτεμις --> 118
Αιμίλιος --> 118
Δανάη --> 117
Αθανασία --> 124
Κλάρα --> 134
Πολίνα --> 146
```

In [73]:
```
pick()
```

Out[73]:
```
'Πολίνα'
```

In [74]:
```
from collections import defaultdict
```

In [76]:
```
d = {}
```

In [77]:
```
d['Νίκος'] += 1
```

```
---------------------------------------------------------------------------
KeyError                                  Traceback (most recent call last)
<ipython-input-77-0bd335f53304> in <module>()
----> 1 d['Νίκος'] += 1

KeyError: 'Νίκος'
```

In [78]:
```
d['Νίκος'] = 0
```

In [79]:
```
d['Νίκος']+=1
```

In [81]:
```
d['Νίκος']
```

Out[81]:
```
1
```

In [82]:
```
l = [pick() for x in range(1000)]
```

In [86]:
```
d = {}
for x in l:
    if not x in d:
        d[x] = 0
    d[x] += 1
```

In [88]:
```
d
```

Out[88]:
```
{'Δανάη': 144,
 'Αθανασία': 101,
 'Αιμίλιος': 126,
 'Άρτεμις': 136,
 'Κλάρα': 131,
 'Πολίνα': 120,
 'Έλσα': 122,
 'Νίκος': 120}
```

In [89]:
```
e = defaultdict(int)
d = {}
```

In [90]:
```
e['Μήτσος']
```

Out[90]:
```
0
```

In [92]:
```
 d['Μήτσος']
```

```
---------------------------------------------------------------------------
KeyError                                  Traceback (most recent call last)
<ipython-input-92-d444eb9fbe9c> in <module>()
----> 1 d['Μήτσος']

KeyError: 'Μήτσος'
```

In [94]:
```
e=defaultdict(int)
for x in l:
    e[x] += 1
```

In [96]:
```
e
```

Out[96]:
```
defaultdict(int,
            {'Δανάη': 144,
             'Αθανασία': 101,
             'Αιμίλιος': 126,
             'Άρτεμις': 136,
             'Κλάρα': 131,
             'Πολίνα': 120,
             'Έλσα': 122,
             'Νίκος': 120})
```

In [97]:
```
e=defaultdict(list)
```

In [98]:
```
e['Mitsos']
```

Out[98]:
```
[]
```

In [101]:
```
pick()
```

Out[101]:
```
'Δανάη'
```

In [107]:
```
a=[2,3,4,2,3,4,5,8]
```

In [105]:
```
for i in range(len(a)-1):
    if a[i]>a[i+1]:
        pass
```

In [109]:
```
b = [(a[i], a[i+1]) for i in range(0, len(a)-1, 2)]
```

In [111]:
```
b
```

Out[111]:
```
[(2, 3), (4, 2), (3, 4), (5, 8)]
```

In [113]:
```
c = []
for x,y in b:
    c.append(x)
    c.append(y)
c
```

Out[113]:
```
[2, 3, 4, 2, 3, 4, 5, 8]
```

In [114]:
```
c = []
for x in b:
    c.extend(x)
c
```

Out[114]:
```
[2, 3, 4, 2, 3, 4, 5, 8]
```

In [115]:
```
c = [3,4,5]
```

In [117]:
```
c.append(8)
c
```

Out[117]:
```
[3, 4, 5, 8]
```

In [119]:
```
c.append([1,2])
c
```

Out[119]:
```
[3, 4, 5, 8, [1, 2]]
```

In [120]:
```
c = [3,4,5,8]
c.extend([1,2])
c
```

Out[120]:
```
[3, 4, 5, 8, 1, 2]
```

In [121]:
```
b
```

Out[121]:
```
[(2, 3), (4, 2), (3, 4), (5, 8)]
```

In [123]:
```
[y for x in b for y in x] # Flattening
```

Out[123]:
```
[2, 3, 4, 2, 3, 4, 5, 8]
```

In [124]:
```
d = []
for x in b:
    for y in x:
        d.append(y)
d
```

Out[124]: [2, 3, 4, 2, 3, 4, 5, 8]

In [1]:
```
import random
```

In [224]:
```
random.random()
```

Out[224]: 0.06275633799325842

In [194]:
```
random.randint(5,29)
```

Out[194]: 12

In [226]:
```
min(random.random() for i in range(1000000))
```

Out[226]: 9.48162305003386e-07

In [2]:
```
max(random.random() for i in range(1000000))
```

Out[2]: 0.9999994186753176

In [94]:
```
a=[5,4,6,3,5]
random.shuffle(a)
a
```

Out[94]: [3, 6, 5, 5, 4]

In [102]:
```
random.choice(a)
```

Out[102]: 4

In [103]:
```
import itertools
```

In [106]:
```
students
```

Out[106]:
```
['Πολίνα',
 'Έλσα',
 'Νίκος',
 'Αιμίλιος',
 'Αθανασία',
 'Κλάρα',
 'Άρτεμις',
 'Δανάη']
```

In [109]:
```
for c in itertools.combinations(students, 2):
    print (c)
```

```
('Πολίνα', 'Έλσα')
('Πολίνα', 'Νίκος')
('Πολίνα', 'Αιμίλιος')
('Πολίνα', 'Αθανασία')
('Πολίνα', 'Κλάρα')
('Πολίνα', 'Άρτεμις')
('Πολίνα', 'Δανάη')
('Έλσα', 'Νίκος')
('Έλσα', 'Αιμίλιος')
('Έλσα', 'Αθανασία')
('Έλσα', 'Κλάρα')
('Έλσα', 'Άρτεμις')
('Έλσα', 'Δανάη')
('Νίκος', 'Αιμίλιος')
('Νίκος', 'Αθανασία')
('Νίκος', 'Κλάρα')
('Νίκος', 'Άρτεμις')
('Νίκος', 'Δανάη')
('Αιμίλιος', 'Αθανασία')
('Αιμίλιος', 'Κλάρα')
('Αιμίλιος', 'Άρτεμις')
('Αιμίλιος', 'Δανάη')
('Αθανασία', 'Κλάρα')
('Αθανασία', 'Άρτεμις')
('Αθανασία', 'Δανάη')
('Κλάρα', 'Άρτεμις')
('Κλάρα', 'Δανάη')
('Άρτεμις', 'Δανάη')
```

In [110]:
```
for c in itertools.combinations(students, 3):
    print (c)
```

```
('Πολίνα', 'Έλσα', 'Νίκος')
('Πολίνα', 'Έλσα', 'Αιμίλιος')
('Πολίνα', 'Έλσα', 'Αθανασία')
('Πολίνα', 'Έλσα', 'Κλάρα')
('Πολίνα', 'Έλσα', 'Άρτεμις')
('Πολίνα', 'Έλσα', 'Δανάη')
('Πολίνα', 'Νίκος', 'Αιμίλιος')
('Πολίνα', 'Νίκος', 'Αθανασία')
('Πολίνα', 'Νίκος', 'Κλάρα')
('Πολίνα', 'Νίκος', 'Άρτεμις')
('Πολίνα', 'Νίκος', 'Δανάη')
('Πολίνα', 'Αιμίλιος', 'Αθανασία')
('Πολίνα', 'Αιμίλιος', 'Κλάρα')
('Πολίνα', 'Αιμίλιος', 'Άρτεμις')
('Πολίνα', 'Αιμίλιος', 'Δανάη')
('Πολίνα', 'Αθανασία', 'Κλάρα')
('Πολίνα', 'Αθανασία', 'Άρτεμις')
('Πολίνα', 'Αθανασία', 'Δανάη')
('Πολίνα', 'Κλάρα', 'Άρτεμις')
('Πολίνα', 'Κλάρα', 'Δανάη')
('Πολίνα', 'Άρτεμις', 'Δανάη')
('Έλσα', 'Νίκος', 'Αιμίλιος')
('Έλσα', 'Νίκος', 'Αθανασία')
('Έλσα', 'Νίκος', 'Κλάρα')
('Έλσα', 'Νίκος', 'Άρτεμις')
('Έλσα', 'Νίκος', 'Δανάη')
('Έλσα', 'Αιμίλιος', 'Αθανασία')
('Έλσα', 'Αιμίλιος', 'Κλάρα')
('Έλσα', 'Αιμίλιος', 'Άρτεμις')
('Έλσα', 'Αιμίλιος', 'Δανάη')
('Έλσα', 'Αθανασία', 'Κλάρα')
('Έλσα', 'Αθανασία', 'Άρτεμις')
('Έλσα', 'Αθανασία', 'Δανάη')
('Έλσα', 'Κλάρα', 'Άρτεμις')
('Έλσα', 'Κλάρα', 'Δανάη')
('Έλσα', 'Άρτεμις', 'Δανάη')
('Νίκος', 'Αιμίλιος', 'Αθανασία')
('Νίκος', 'Αιμίλιος', 'Κλάρα')
('Νίκος', 'Αιμίλιος', 'Άρτεμις')
('Νίκος', 'Αιμίλιος', 'Δανάη')
('Νίκος', 'Αθανασία', 'Κλάρα')
('Νίκος', 'Αθανασία', 'Άρτεμις')
('Νίκος', 'Αθανασία', 'Δανάη')
('Νίκος', 'Κλάρα', 'Άρτεμις')
('Νίκος', 'Κλάρα', 'Δανάη')
('Νίκος', 'Άρτεμις', 'Δανάη')
('Αιμίλιος', 'Αθανασία', 'Κλάρα')
('Αιμίλιος', 'Αθανασία', 'Άρτεμις')
('Αιμίλιος', 'Αθανασία', 'Δανάη')
('Αιμίλιος', 'Κλάρα', 'Άρτεμις')
('Αιμίλιος', 'Κλάρα', 'Δανάη')
('Αιμίλιος', 'Άρτεμις', 'Δανάη')
('Αθανασία', 'Κλάρα', 'Άρτεμις')
('Αθανασία', 'Κλάρα', 'Δανάη')
('Αθανασία', 'Άρτεμις', 'Δανάη')
('Κλάρα', 'Άρτεμις', 'Δανάη')
```

In [111]:
```
a = list(itertools.combinations(range(1,50), 6))
```

In [112]:
```
len(a)
```

Out[112]: 13983816

In [113]:
```
a[1000]
```

Out[113]:
```
(1, 2, 3, 5, 6, 17)
```

In [114]:
```
from itertools import cycle
```

In [115]:
```
a = cycle(students)
```

In [155]:
```
next(a)
```

Out[155]:
```
'Δανάη'
```

In [156]:
```
places = [
    'Germany', 'Italy', 'France'
]
```

In [157]:
```
for x in itertools.product(students, places):
    print (x)
```

```
('Πολίνα', 'Germany')
('Πολίνα', 'Italy')
('Πολίνα', 'France')
('Έλσα', 'Germany')
('Έλσα', 'Italy')
('Έλσα', 'France')
('Νίκος', 'Germany')
('Νίκος', 'Italy')
('Νίκος', 'France')
('Αιμίλιος', 'Germany')
('Αιμίλιος', 'Italy')
('Αιμίλιος', 'France')
('Αθανασία', 'Germany')
('Αθανασία', 'Italy')
('Αθανασία', 'France')
('Κλάρα', 'Germany')
('Κλάρα', 'Italy')
('Κλάρα', 'France')
('Άρτεμις', 'Germany')
('Άρτεμις', 'Italy')
('Άρτεμις', 'France')
('Δανάη', 'Germany')
('Δανάη', 'Italy')
('Δανάη', 'France')
```

In [158]:
```
import os
```

In [160]:
```
os.path.exists('part1.py')
```

Out[160]:
```
True
```

In [161]:
```
os.path.exists('part2.py')
```

Out[161]:
```
False
```

In [162]:
```
os.path.join('asda', 'asdasd', 'asdasd')
```

Out[162]:
```
'asda/asdasd/asdasd'
```

In [165]:
```
os.getcwd()
```

Out[165]:
```
'/Users/alexandroskanterakis/Downloads'
```

In [167]:
```
os.path.exists('/Users/alexandroskanterakis/part2.py')
```

Out[167]:
```
False
```

In [168]:
```
import re
```

In [169]:
```
a = 'rkjfhalskdfhlaskjdfhlaskdjfh23475623skjdfghsdjklfghsdkljgfh'
```

In [170]:
```
pattern = '[0-9]'
```

In [171]:
```
re.findall(pattern, a)
```

Out[171]:
```
['2', '3', '4', '7', '5', '6', '2', '3']
```

In [172]:
```
re.findall('[0-9]', a)
```

Out[172]:
```
['2', '3', '4', '7', '5', '6', '2', '3']
```

In [173]:
```
re.findall('[0-9]+', a)
```

Out[173]:
```
['23475623']
```

In [175]:
```
re.findall('[\d]+', a)
```

Out[175]:
```
['23475623']
```

In [176]:
```
re.findall('[a-z]+', a)
```

Out[176]:
```
['rkjfhalskdfhlaskjdfhlaskdjfh', 'skjdfghsdjklfghsdkljgfh']
```

In [186]:
```
re.findall('[^\d](69[\d]+)', 'rkjfhalskdfkdjfh6923475623skjdf98769876ghsdkljgfh
')
```

Out[186]:
```
['6923475623']
```

In [187]:
```
a = [
    'adfasdf', '1234asdfasdf', 'asdsdg', '989654gderr'
]
```

In [195]:
```
for x in a:
    found =  re.findall('^\d.+', x)
    print (found)
```

```
[]
['1234asdfasdf']
[]
['989654gderr']
```

In [209]:
```
a = re.search('^\d+', 'sdfgdfgsdfgsdfg')
```

In [222]:
```
a=re.search('(\d+)[^\d]+(\d+)', 'sdfgdfhgsd72345rq5fgsdfg')
```

In [225]:
```
a.group(1)
```

Out[225]:
```
'72345'
```

In [226]:
```
a.group(2)
```

Out[226]:
```
'5'
```

In [227]:
```
a.group(0)
```

Out[227]: '72345rq5'

In [232]:
```
re.findall('TT', 'TTTTTT')
```

Out[232]: ['TT', 'TT', 'TT']

In [210]:
```
if a:
    print ('found')
else:
    print ('not found!')
```

```
not found!
```

In [233]:
```
a = re.findall('^\d+', 'sdfgdfgsdfgsdfg')
if a:
    print ('found')
else:
    print ('not found!')
```

```
not found!
```

In [237]:
```
a = [
    'adfasdf', '1234asdfasdf', 'asdsdg', '989654gderr'
]
for x in a:
    #found =  re.search('^\d', x)
    found =  re.search('f$', x)
    if found:
        print (x)
```

```
adfasdf
1234asdfasdf
```

In [292]:
```
a= re.search(r'\+?\d+', 'sdfgdfhgsd513512345dgsdfg')
a.group(0)
```

Out[292]: '513512345'

In [244]:
```
a= re.search(r'\+?\d+', 'sdfgdfhgsd+513512345dgsdfg')
a.group(0)
```

Out[244]: '+513512345'

In [257]:
```
a= re.search(r'[+-]?\d+', 'sdfgdfhgsd513512345dgsdfg')
a.group(0)
```

Out[257]: '513512345'

In [259]:
```
a= re.search(r'[+-]+\d+', 'sdfgdfhgsd+++513512345dgsdfg')
a.group(0)
```

Out[259]: '+++513512345'

In [260]:
```
a= re.search(r'[+-]*\d+', 'sdfgdfhgsd513512345dgsdfg')
a.group(0)
```

Out[260]: '513512345'

In [266]:
```
a = 'I bought 3 bananas I bought 5 bananas I bought 10 bananas' # Σταματάει στο τελευταίο bananas
result = re.search(r'I bought [\w ]+ bananas', a)
print(result.group())

#a = 'I bought 3 bananas I bought 5 bananas I bought 10 bananas' # Σταματάσει στο πρώτο bananas
#result = re.search(r'I bought [\w ]+? bananas', a)
#print(result.group())
```

```
I bought 3 bananas I bought 5 bananas I bought 10 bananas
```

In [278]:
```
re.search('[^f]f{4,7}[^f]', 'aassfffffffsss')
```

In [279]:
```
a= re.search('[+-]*\d+', '++++-------77777')
a.group(0)
```

Out[279]:
```
'++++-------77777'
```

In [280]:
```
a = 'mitsos'
```

In [282]:
```
a = 'mit\nsos'
```

In [283]:
```
print (a)
```

```
mit
sos
```

In [284]:
```
a = 'mit\\nsos'
```

In [285]:
```
print (a)
```

```
mit\nsos
```

In [286]:
```
a = 'mit\\\\nsos'
```

In [287]:
```
print (a)
```

```
mit\\nsos
```

In [289]:
```
a = 'mit\\\nsos'
print (a)
```

```
mit\
sos
```

In [290]:
```
a = r'mit\nsos'
print (a)
```

```
mit\nsos
```

In [291]:
```
a = 'mit\nsos'
print (a)
```

```
mit
sos
```

In [299]:
```
a = re.search(r'(?P<first>[\w]+)[\s]+(?P<second>[\w]+)',
              'Mitsos          Mitsaklas')
```

In [301]:
```
a.group('first')
```
Out[301]: 'Mitsos'

In [302]:
```
a.group('second')
```
Out[302]: 'Mitsaklas'

In [304]:
```
a.groupdict()
```
Out[304]: {'first': 'Mitsos', 'second': 'Mitsaklas'}

In [305]:
```
a = [1,2,3]
b = [1,2,3]
```

In [306]:
```
a == b
```
Out[306]: True

In [307]:
```
a is b
```
Out[307]: False

In [308]:
```
c = a
```

In [309]:
```
a is c
```
Out[309]: True

In [310]:
```
a
```
Out[310]: [1, 2, 3]

In [311]:
```
c
```
Out[311]: [1, 2, 3]

In [312]:
```
a[0] = 10
```

In [313]:
```
c
```
Out[313]: [10, 2, 3]

In [314]:
```
a
```
Out[314]: [10, 2, 3]

In [315]:
```
import copy
```

In [316]:
```
a = copy.copy(c)
```

In [317]:
```
a = [1,2,3]
```

In [318]:
```
b = [a,a,a]
```

In [319]:
```
b
```
Out[319]: [[1, 2, 3], [1, 2, 3], [1, 2, 3]]

In [320]:
```
c = copy.copy(b)
```

In [321]:
```
c
```

Out[321]:
```
[[1, 2, 3], [1, 2, 3], [1, 2, 3]]
```

In [322]:
```
b[0][0] = 10
```

In [323]:
```
c
```

Out[323]:
```
[[10, 2, 3], [10, 2, 3], [10, 2, 3]]
```

In [324]:
```
d = copy.deepcopy(b)
```

In [325]:
```
d
```

Out[325]:
```
[[10, 2, 3], [10, 2, 3], [10, 2, 3]]
```

In [326]:
```
b[0][0] = -1
```

In [327]:
```
d
```

Out[327]:
```
[[10, 2, 3], [10, 2, 3], [10, 2, 3]]
```

In [328]:
```
a
```

Out[328]:
```
[-1, 2, 3]
```

In [329]:
```
b = a
```

In [330]:
```
b is a
```

Out[330]:
```
True
```

In [331]:
```
id(b)
```

Out[331]:
```
5806038728
```

In [332]:
```
id(a)
```

Out[332]:
```
5806038728
```

In [333]:
```
# Όλα τα ζευγάρια κ,λ θετικών ακεραίων που είναι μικρότεροι ή ίσοι με το 10
```

In [334]:
```
for i in range(1,11):
    for j in range(1,11):
        print (i,j)
```

```
1 1
1 2
1 3
1 4
1 5
1 6
1 7
1 8
1 9
1 10
2 1
2 2
2 3
2 4
2 5
2 6
2 7
2 8
2 9
2 10
3 1
3 2
3 3
3 4
3 5
3 6
3 7
3 8
3 9
3 10
4 1
4 2
4 3
4 4
4 5
4 6
4 7
4 8
4 9
4 10
5 1
5 2
5 3
5 4
5 5
5 6
5 7
5 8
5 9
5 10
6 1
6 2
6 3
6 4
6 5
6 6
6 7
6 8
6 9
6 10
7 1
7 2
7 3
7 4
7 5
7 6
7 7
7 8
```

In [341]:
```
a = [1,2,3,4,5]
```

In [342]:
```
def f(x):
    return x>3
```

In [344]:
```
list(filter(f, a))
```

Out[344]: [4, 5]

In [345]:
```
list(filter(lambda x : x>3, a))
```

Out[345]: [4, 5]

In [ ]:
```

```

In [354]:
```
def f(x):
    return x*2
```

In [355]:
```
list(map(f,a))
```

Out[355]: [2, 4, 6, 8, 10]

In [367]:
```
type(f)
```

Out[367]: function

In [368]:
```
def f():
    return 42
```

In [369]:
```
f = lambda : 42
```

In [370]:
```
def f(x):
    return x*2

f = lambda x : x*2
```