In [16]:
```
students = [
    'student 1',
    'student 2'
]

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

In [453]:
```
def pick2():
    while True:
        for student in random.shuffle(students):
            yield student
```

In [429]:
```
a = [1,2,3,4]
random.shuffle(a)
print (a)
```

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

In [452]:
```
a = [1,2,3,4]
print (random.choice(a))
```

```
2
```

In [ ]:
```

```

In [390]:
```
gen = pick2()
```

In [391]:
```
for i in range(100):
    print (next(gen))
```

```
Πολίνα
Ιπποκράτης
Αιμίλιος
Νίκος
Δανάη
Αθανασία
Έλσα
Γιάννης
Πολίνα
Ιπποκράτης
Αιμίλιος
Νίκος
Δανάη
Αθανασία
Έλσα
Γιάννης
Πολίνα
Ιπποκράτης
Αιμίλιος
Νίκος
Δανάη
Αθανασία
Έλσα
Γιάννης
Πολίνα
Ιπποκράτης
Αιμίλιος
Νίκος
Δανάη
Αθανασία
Έλσα
Γιάννης
Πολίνα
Ιπποκράτης
Αιμίλιος
Νίκος
Δανάη
Αθανασία
Έλσα
Γιάννης
Πολίνα
Ιπποκράτης
Αιμίλιος
Νίκος
Δανάη
Αθανασία
Έλσα
Γιάννης
Πολίνα
Ιπποκράτης
Αιμίλιος
Νίκος
Δανάη
Αθανασία
Έλσα
Γιάννης
Πολίνα
Ιπποκράτης
Αιμίλιος
Νίκος
Δανάη
Αθανασία
Έλσα
Γιάννης
Πολίνα
```

In [ ]:

In [380]:
```
next(gen)
```
Out[380]: 'Πολίνα'

In [381]:
```
next(gen)
```
Out[381]: 'Ιπποκράτης'

In [382]:
```
next(gen)
```
Out[382]: 'Αιμίλιος'

In [383]:
```
next(gen)
```
Out[383]: 'Νίκος'

In [384]:
```
next(gen)
```
Out[384]: 'Δανάη'

In [385]:
```
next(gen)
```
Out[385]: 'Αθανασία'

In [386]:
```
next(gen)
```
Out[386]: 'Έλσα'

In [387]:
```
next(gen)
```
Out[387]: 'Γιάννης'

In [388]:
```
next(gen)
```

```
---------------------------------------------------------------------------
StopIteration                             Traceback (most recent call last)
<ipython-input-388-6e72e47198db> in <module>()
----> 1 next(gen)

StopIteration:
```

In [ ]:

In [2]:
```
pick()
```
Out[2]: 'Αθανασία'

In [15]:
```
a = [4,1,2]
```

In [4]:
```
sorted(a)
```
Out[4]: [1, 2, 4]

In [5]:
```
a
```
Out[5]: [4, 1, 2]

In [6]:
```
a.sort()
```

In [7]:
```
a
```
Out[7]:
```
[1, 2, 4]
```

In [8]:
```
_
```
Out[8]:
```
[1, 2, 4]
```

In [9]:
```
42
```
Out[9]:
```
42
```

In [10]:
```
_
```
Out[10]:
```
42
```

In [11]:
```
sorted(a)
```
Out[11]:
```
[1, 2, 4]
```

In [12]:
```
_
```
Out[12]:
```
[1, 2, 4]
```

In [17]:
```
sorted(a)
```
Out[17]:
```
[1, 2, 4]
```

In [18]:
```
a
```
Out[18]:
```
[4, 1, 2]
```

In [20]:
```
_
```
Out[20]:
```
[4, 1, 2]
```

In [21]:
```
a = [
    ('kosta', 15),
    ('manoli', 13),
    ('maria', 20),
]
```

In [22]:
```
min(a)
```
Out[22]:
```
('kosta', 15)
```

In [23]:
```
pick()
```
Out[23]:
```
'Νίκος'
```

In [24]:
```
[(grade, name) for name, grade in a]
```
Out[24]:
```
[(15, 'kosta'), (13, 'manoli'), (20, 'maria')]
```

In [25]:
```
min([(grade, name) for name, grade in a])
```
Out[25]:
```
(13, 'manoli')
```

In [26]:
```
a
```
Out[26]:
```
[('kosta', 15), ('manoli', 13), ('maria', 20)]
```

In [32]:
```
def f(item):
    return item[1]
```

In [31]:
```
pick()
```

Out[31]: 'Αιμίλιος'

In [30]:
```
a[0]
```

Out[30]: ('kosta', 15)

In [33]:
```
f(a[0])
```

Out[33]: 15

In [36]:
```
min(a, key=f)
```

Out[36]: ('manoli', 13)

In [38]:
```
pick()
```

Out[38]: 'Νίκος'

In [ ]:

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

Out[35]: [('kosta', 15), ('manoli', 13), ('maria', 20)]

In [37]:
```
sorted(a, key=f)
```

Out[37]: [('manoli', 13), ('kosta', 15), ('maria', 20)]

In [41]:
```
f(a)
```

Out[41]: ('manoli', 13)

In [43]:
```
pick()
```

Out[43]: 'Νίκος'

In [ ]:

In [42]:
```
students
```

Out[42]:
```
['Πολίνα',
 'Ιπποκράτης',
 'Αιμίλιος',
 'Νίκος',
 'Δανάη',
 'Αθανασία',
 'Έλσα',
 'Γιάννης']
```

In [44]:
```
sorted(students)
```

Out[44]:
```
['Έλσα',
 'Αθανασία',
 'Αιμίλιος',
 'Γιάννης',
 'Δανάη',
 'Ιπποκράτης',
 'Νίκος',
 'Πολίνα']
```

In [75]:
```
pick()
```

Out[75]:
```
'Νίκος'
```

In [76]:
```
sorted(students, key=len)
```

Out[76]:
```
['Έλσα',
 'Νίκος',
 'Δανάη',
 'Πολίνα',
 'Γιάννης',
 'Αιμίλιος',
 'Αθανασία',
 'Ιπποκράτης']
```

In [78]:
```
sorted(students, key=len, reverse=True)
```

Out[78]:
```
['Ιπποκράτης',
 'Αιμίλιος',
 'Αθανασία',
 'Γιάννης',
 'Πολίνα',
 'Νίκος',
 'Δανάη',
 'Έλσα']
```

In [79]:
```
a
```

Out[79]:
```
[('kosta', 15), ('manoli', 13), ('maria', 20)]
```

In [80]:
```
def f(item):
    return item[1]
```

In [ ]:
```
sorted(a, key=f)
```

In [81]:
```
lambda item : item[1]
```

Out[81]:
```
<function __main__.<lambda>(item)>
```

In [84]:
```
(lambda item : item[1])([2,3])
```

Out[84]:
```
3
```

In [ ]:
```

```

In [82]:
```
pick()
```

Out[82]:
```
'Πολίνα'
```

In [83]:
```
f([2,3])
```

Out[83]:
```
3
```

In [85]:
```
f = lambda item : item[1]
```

In [86]:
```
min(a, key=lambda item : item[1])
```

Out[86]:
```
('manoli', 13)
```

In [93]:
```
min(a, key=lambda item : item[1])
```

Out[93]:
```
('manoli', 13)
```

In [ ]:
```

```

In [ ]:
```

```

In [ ]:
```

```

In [87]:
```
students
```

Out[87]:
```
['Πολίνα',
 'Ιπποκράτης',
 'Αιμίλιος',
 'Νίκος',
 'Δανάη',
 'Αθανασία',
 'Έλσα',
 'Γιάννης']
```

In [88]:
```
pick()
```

Out[88]:
```
'Δανάη'
```

In [89]:
```
sorted(students, key=lambda item:item[1])
```

Out[89]:
```
['Νίκος',
 'Δανάη',
 'Αθανασία',
 'Αιμίλιος',
 'Γιάννης',
 'Έλσα',
 'Πολίνα',
 'Ιπποκράτης']
```

In [94]:
```
a=[4,2,3]
```

In [95]:
```
pick()
```

Out[95]:
```
'Έλσα'
```

In [100]:
```
new_list = [i*2 for i in a]
```

In [ ]:
```

```

In [97]:
```
new_list = []
for i in a:
    new_list.append(i*2)
```

In [98]:
```
new_list
```

Out[98]:
```
[8, 4, 6]
```

In [101]:
```
def g(x):
    return x*2
```

In [102]:
```
a
```

Out[102]:
```
[4, 2, 3]
```

In [105]:
```
map(g, a)
```

Out[105]:
```
<map at 0x10da55748>
```

In [104]:
```
list(map(g, a))
```

Out[104]:
```
[8, 4, 6]
```

In [106]:
```
list(map(lambda x :x*2 , a))
```

Out[106]:
```
[8, 4, 6]
```

In [108]:
```
what = lambda x: lambda y:y+x
```

In [110]:
```
what(3)(4)
```

Out[110]:
```
7
```

Functional programming

Generators

In [111]:
```
def f():
    return 4
```

In [115]:
```
pick()
```

Out[115]:
```
'Νίκος'
```

In [113]:
```
f()
```

Out[113]:
```
4
```

In [114]:
```
def f():
    return 4
    return 5
```

In [116]:
```
f()
```

Out[116]:
```
4
```

In [117]:
```
f()
```

Out[117]:
```
4
```

In [118]:
```
def g():
    yield 4
    yield 5
```

In [119]:
```
gen = g()
```

In [120]:
```
type(gen)
```

Out[120]:
```
generator
```

In [121]:
```
next(gen)
```

Out[121]:
```
4
```

In [122]:
```
next(gen)
```

Out[122]:
```
5
```

In [123]:
```
next(gen)
```

```
---------------------------------------------------------------------------
StopIteration                             Traceback (most recent call last)
<ipython-input-123-6e72e47198db> in <module>()
----> 1 next(gen)

StopIteration:
```

In [124]:
```
gen
```

Out[124]:
```
<generator object g at 0x10d992930>
```

In [285]:
```
import math

def is_prime(x):

    if x in [1,2,3]:
        return True

    for i in range(2, int(math.sqrt(x))+1):
        if not x%i:
            return False
    return True

def prime_generator():
    start = 1
    #while start<100:
    while True:
        if is_prime(start):
            yield start
        start += 1
```

In [135]:
```
is_prime(24)
```

Out[135]:
```
False
```

In [256]:
```
gen = prime_generator()
```

In [283]:
```
next(gen)
```

```
---------------------------------------------------------------------------
StopIteration                             Traceback (most recent call last)
<ipython-input-283-6e72e47198db> in <module>()
----> 1 next(gen)

StopIteration:
```

In [181]:
```
next(gen)
```

Out[181]: 2

In [182]:
```
next(gen)
```

Out[182]: 3

In [183]:
```
next(gen)
```

Out[183]: 5

In [184]:
```
next(gen)
```

Out[184]: 7

In [254]:
```
next(gen)
```

Out[254]: 373

In [286]:
```
gen = prime_generator()
first_100_p = [next(gen) for x in range(100)]
```

In [288]:
```
primers_lower_100 = []
gen = prime_generator()
while True:
    p = next(gen)
    if p>100:
        break

    primers_lower_100.append(p)
```

In [289]:
```
primers_lower_100
```

Out[289]:
```
[1,
 2,
 3,
 5,
 7,
 11,
 13,
 17,
 19,
 23,
 29,
 31,
 37,
 41,
 43,
 47,
 53,
 59,
 61,
 67,
 71,
 73,
 79,
 83,
 89,
 97]
```

In [296]:
```
pick()
```

Out[296]:
```
'Γιάννης'
```

In [302]:
```
i=0
while i<20:

    if i>5:
        break
    i += 1
    print (i)
```

```
1
2
3
4
5
6
```

In [301]:
```
i=0
while i<20:
    i += 1
    if i<5:
        continue

    print (i)
```

```
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
```

In [ ]:

In [299]:
```
pick()
```

Out[299]: 'Νίκος'

In [ ]:

In [294]:
```
list(range(1,21))
```

Out[294]: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20]

In [290]:
```
pick()
```

Out[290]: 'Ιπποκράτης'

In [305]:
```
i=0
while i<20:

    if i>10:
        break
    i += 1
    print (i)
else:
    print ('HIT BREAK')
```

```
1
2
3
4
5
6
7
8
9
10
11
```

In [306]:
```
i=0
while i<20:

    if i>50:
        break
    i += 1
    print (i)
else:
    print ('HIT BREAK')
```

```
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
HIT BREAK
```

In [307]:
```
first_100_p
```

Out[307]:
```
[1,
 2,
 3,
 5,
 7,
 11,
 13,
 17,
 19,
 23,
 29,
 31,
 37,
 41,
 43,
 47,
 53,
 59,
 61,
 67,
 71,
 73,
 79,
 83,
 89,
 97,
 101,
 103,
 107,
 109,
 113,
 127,
 131,
 137,
 139,
 149,
 151,
 157,
 163,
 167,
 173,
 179,
 181,
 191,
 193,
 197,
 199,
 211,
 223,
 227,
 229,
 233,
 239,
 241,
 251,
 257,
 263,
 269,
 271,
 277,
 281,
 283,
 293,
 307,
 311,
 313,
```

In [308]:
```
abs(-3)
```

Out[308]: 3

In [310]:
```
abs(-1212.1232)
```

Out[310]: 1212.1232

In [311]:
```
age=40
if age>=18:
    status='adult'
else:
    status='underage'
```

In [313]:
```
status
```

Out[313]: 'adult'

In [318]:
```
status = 'adult' if age>=18 else 'underage'
```

In [321]:
```
status
```

Out[321]: 'adult'

In [315]:
```
status = lambda age: 'adult' if age>=18 else 'underage'
```

In [317]:
```
status(10)
```

Out[317]: 'underage'

In [326]:
```
age = input('what is your age?   ')
```

```
what is your age?   1231234
```

In [324]:
```
int(age)
```

Out[324]: 1234

In [327]:
```
a=3
```

In [329]:
```
a
```

Out[329]: 3

In [330]:
```
del a
```

In [331]:
```
a
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
<ipython-input-331-3f786850e387> in <module>()
----> 1 a

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

In [332]:
```
a = [1,2,3,4]
```

In [333]:
```
del a[-1]
```

In [334]:
```
a
```

Out[334]:
```
[1, 2, 3]
```

In [335]:
```
a = {
    'name': 'mitsos',
    'age': 50
}
```

In [336]:
```
a
```

Out[336]:
```
{'name': 'mitsos', 'age': 50}
```

In [337]:
```
del a['name']
```

In [338]:
```
a
```

Out[338]:
```
{'age': 50}
```

In [344]:
```
def f():
    a = list(range(100000000))
    return 42
```

In [343]:
```
f()
```

Out[343]:
```
42
```

In [358]:
```
def f(age):
    assert 0<=age<=100 # TI HLIKIA EINAI AUTH RE?
    assert type(age) is int # LA8OS TYPO!
    return 'adult' if age>=18 else 'underage'
```

In [349]:
```
f(50)
```

Out[349]:
```
'adult'
```

In [351]:
```
f(14)
```

Out[351]:
```
'underage'
```

In [356]:
```
f(200)
```

```
---------------------------------------------------------------------------
AssertionError                            Traceback (most recent call last)
<ipython-input-356-a403249833e6> in <module>()
----> 1 f(200)

<ipython-input-355-93f5b89bce83> in f(age)
      1 def f(age):
----> 2     assert 0<=age<=100 # TI HLIKIA EINAI AUTH RE?
      3     assert type(age) is int
      4     return 'adult' if age>=18 else 'underage'

AssertionError:
```

In [359]:
```
f(14.3)
```

```
---------------------------------------------------------------------------
AssertionError                            Traceback (most recent call last)
<ipython-input-359-76580c14de57> in <module>()
----> 1 f(14.3)

<ipython-input-358-7f57e1af76ea> in f(age)
      1 def f(age):
      2     assert 0<=age<=100 # TI HLIKIA EINAI AUTH RE?
----> 3     assert type(age) is int # LA8OS TYPO!
      4     return 'adult' if age>=18 else 'underage'

AssertionError:
```

In [360]:
```
gen = prime_generator()
```

In [361]:
```
next(gen)
```

Out[361]: 1

In [362]:
```
next(gen)
```

Out[362]: 2

In [363]:
```
def f():
    for i in range(10):
        yield i
```

In [364]:
```
gen = f()
```

In [366]:
```
next(gen)
```

Out[366]: 0

In [368]:
```
next(gen)
```

Out[368]: 1

In [369]:
```
list(gen)
```

Out[369]: [2, 3, 4, 5, 6, 7, 8, 9]

In [372]:
```
next(gen)
```

```
---------------------------------------------------------------------------
StopIteration                             Traceback (most recent call last)
<ipython-input-372-6e72e47198db> in <module>()
----> 1 next(gen)

StopIteration:
```

In [373]:
```
gen = f()
```

In [374]:
```
next(gen)
```

Out[374]: 0

In [375]:
```
next(gen)
```

Out[375]: 1

In [376]:
```
next(gen)
```

Out[376]: 2

In [377]:
```
list(gen)
```

Out[377]: [3, 4, 5, 6, 7, 8, 9]

In [ ]:
```

```

In [465]:
```
pick()
```

Out[465]: 'Ελσα'

Generator comprehension

In [466]:
```
def f():
    for i in range(10):
        yield i
```

In [472]:
```
gen = (i for i in range(10))
```

In [468]:
```
next(gen)
```

Out[468]: 0

In [469]:
```
next(gen)
```

Out[469]: 1

In [470]:
```
next(gen)
```

Out[470]: 2

In [471]:
```
list(gen)
```

Out[471]: [3, 4, 5, 6, 7, 8, 9]

In [480]:
```
gen = (i for i in range(10,25,3))
```

In [474]:
```
list(gen)
```

Out[474]: [10, 13, 16, 19, 22]

In [477]:
```
list(enumerate(gen))
```

Out[477]: [(0, 10), (1, 13), (2, 16), (3, 19), (4, 22)]

In [481]:
```
for i, item in enumerate(gen):
    if i%2==0:
        continue

    print (item)
```

```
13
19
```

Files

In [523]:
```
with open('test.txt', 'w') as f:
    f.write('Mitsos\n')
```

In [524]:
```
!cat test.txt
```

```
Mitsos
```

In [525]:
```
!cat t.txt
```

```
hello
my name is Alex
```

In [526]:
```
with open('t.txt', 'r') as f:
    content = f.read()
content
```

Out[526]:
```
'hello\nmy name is Alex\n'
```

In [527]:
```
print (content)
```

```
hello
my name is Alex
```

In [538]:
```
with open('DMET_14GreekGenomes_chr4.vcf', 'r') as f:
    content=f.read()
```

In [539]:
```
type(content)
```

Out[539]:
```
str
```

In [532]:
```
with open('DMET_14GreekGenomes_chr4.vcf', 'r') as f:
    for line in f:
        #print (line)
        pass
```

In [536]:
```
with open('DMET_14GreekGenomes_chr4.vcf', 'r') as f:
    print (f.readline().strip())
    print (f.readline().strip())
```

```
##fileformat=VCFv4.1
#CHROM  POS     ID      REF     ALT     QUAL    FILTER  INFO    FORMAT  SAMPLE_
1       SAMPLE_2        SAMPLE_3        SAMPLE_4        SAMPLE_5        SAMPLE_
6       SAMPLE_7        SAMPLE_8        SAMPLE_9        SAMPLE_10       SAMPLE_
11      SAMPLE_12       SAMPLE_13       SAMPLE_14
```

In [540]:
```
with open('DMET_14GreekGenomes_chr4.vcf', 'r') as f:
    content = f.readlines()
```

In [541]:
```
type(content)
```

Out[541]:
```
list
```

In [542]:
```
len(content)
```

Out[542]:
```
26565
```

In [543]:
```
content[999]
```

Out[543]:
```
'chr4\t23569326\tdbsnp.125:rs28867777\tG\tA\t.\t.\t.\tGT\t1/0\t0/0\t0/0\t0/0\t1/0\t0/
0\t0/0\t0/0\t0/0\t0/0\t0/0\t0/0\t0/0\t0/0\t0/0\t0/0\n'
```

In [545]:
```
content[999].strip().split('\t')
```

Out[545]:
```
['chr4',
 '23569326',
 'dbsnp.125:rs28867777',
 'G',
 'A',
 '.',
 '.',
 '.',
 'GT',
 '1/0',
 '0/0',
 '0/0',
 '1/0',
 '0/0',
 '0/0',
 '0/0',
 '0/0',
 '0/0',
 '0/0',
 '0/0',
 '0/0',
 '0/0',
 '0/0']
```

In [546]:
```
!python test.py
```

```
hello
```

In [547]:
```
!./test.py
```

```
hello
```

In [ ]:
```

```

In [576]:
```
f = open('DMET_14GreekGenomes_chr4.vcf', 'r')
```

In [549]:
```
content = f.readlines()
```

In [550]:
```
len(content)
```

Out[550]:
```
26565
```

In [551]:
```
content = f.readlines()
```

In [552]:
```
len(content)
```

Out[552]:
```
0
```

In [553]:
```
f.read()
```

Out[553]:
```
''
```

In [554]:
```
f.readline()
```

Out[554]:
```
''
```

In [555]:
```
f.readlines()
```

Out[555]:
```
[]
```

In [556]:
```
f.close()
```

In [578]:
```
with open('test.txt', 'r') as f1, open('test2.txt', 'w') as f2:
    for l in f1:
        f2.write(l.strip() + '  asdasD\n')
```

In [579]:
```
!cat test2.txt
```

```
Mitsos  asdasD
```

In [580]:
```
! wget -O Wq2PpbZy.txt https://pastebin.com/raw/Wq2PpbZy
```

```
--2019-11-12 11:48:25--  https://pastebin.com/raw/Wq2PpbZy (https://pastebin.co
m/raw/Wq2PpbZy)
Resolving pastebin.com (pastebin.com)... 104.22.3.84, 104.22.2.84
Connecting to pastebin.com (pastebin.com)|104.22.3.84|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: unspecified [text/plain]
Saving to: 'Wq2PpbZy.txt'

Wq2PpbZy.txt            [ <=>                ]   4.91K  --.-KB/s    in 0.001s

2019-11-12 11:48:26 (8.91 MB/s) - 'Wq2PpbZy.txt' saved [5027]
```

In [582]:
```
with open('Wq2PpbZy.txt', 'r') as f:
    content = f.read()
```

In [584]:
```
print (content)
```

```
Sepal length    Sepal width     Petal length    Petal width     Species
5.2     3.5     1.4     0.2     I. setosa
4.9     3.0     1.4     0.2     I. setosa
4.7     3.2     1.3     0.2     I. setosa
4.6     3.1     1.5     0.2     I. setosa
5.0     3.6     1.4     0.3     I. setosa
5.4     3.9     1.7     0.4     I. setosa
4.6     3.4     1.4     0.3     I. setosa
5.0     3.4     1.5     0.2     I. setosa
4.4     2.9     1.4     0.2     I. setosa
4.9     3.1     1.5     0.1     I. setosa
5.4     3.7     1.5     0.2     I. setosa
4.8     3.4     1.6     0.2     I. setosa
4.8     3.0     1.4     0.1     I. setosa
4.3     3.0     1.1     0.1     I. setosa
5.8     4.0     1.2     0.2     I. setosa
5.7     4.4     1.5     0.4     I. setosa
5.4     3.9     1.3     0.4     I. setosa
5.1     3.5     1.4     0.3     I. setosa
5.7     3.8     1.7     0.3     I. setosa
```

In [585]:
```
c = content.split('\n')
```

In [588]:
```
c = [line.split('\t') for line in content.split('\n')]
```

In [589]:
```
c[30]
```

Out[589]:
```
['4.7 ', '3.2 ', '1.6 ', '0.2 ', 'I. setosa']
```

In [591]:
```
header = c[0]
```

In [593]:
```
header = [x.strip() for x in header]
header
```

Out[593]:
```
['Sepal length', 'Sepal width', 'Petal length', 'Petal width', 'Species']
```

In [595]:
```
c = c[1:]
```

In [597]:
```
[float(line[0]) for line in c if line[-1] == 'I. setosa']
```

Out[597]:
```
[5.2,
 4.9,
 4.7,
 4.6,
 5.0,
 5.4,
 4.6,
 5.0,
 4.4,
 4.9,
 5.4,
 4.8,
 4.8,
 4.3,
 5.8,
 5.7,
 5.4,
 5.1,
 5.7,
 5.1,
 5.4,
 5.1,
 4.6,
 5.1,
 4.8,
 5.0,
 5.0,
 5.2,
 5.2,
 4.7,
 4.8,
 5.4,
 5.2,
 5.5,
 4.9,
 5.0,
 5.5,
 4.9,
 4.4,
 5.1,
 5.0,
 4.5,
 4.4,
 5.0,
 5.1,
 4.8,
 5.1,
 4.6,
 5.3,
 5.0]
```

In [598]:
```
c
```

Out[598]:
```
[['5.2 ', '3.5 ', '1.4 ', '0.2 ', 'I. setosa'],
 ['4.9 ', '3.0 ', '1.4 ', '0.2 ', 'I. setosa'],
 ['4.7 ', '3.2 ', '1.3 ', '0.2 ', 'I. setosa'],
 ['4.6 ', '3.1 ', '1.5 ', '0.2 ', 'I. setosa'],
 ['5.0 ', '3.6 ', '1.4 ', '0.3 ', 'I. setosa'],
 ['5.4 ', '3.9 ', '1.7 ', '0.4 ', 'I. setosa'],
 ['4.6 ', '3.4 ', '1.4 ', '0.3 ', 'I. setosa'],
 ['5.0 ', '3.4 ', '1.5 ', '0.2 ', 'I. setosa'],
 ['4.4 ', '2.9 ', '1.4 ', '0.2 ', 'I. setosa'],
 ['4.9 ', '3.1 ', '1.5 ', '0.1 ', 'I. setosa'],
 ['5.4 ', '3.7 ', '1.5 ', '0.2 ', 'I. setosa'],
 ['4.8 ', '3.4 ', '1.6 ', '0.2 ', 'I. setosa'],
 ['4.8 ', '3.0 ', '1.4 ', '0.1 ', 'I. setosa'],
 ['4.3 ', '3.0 ', '1.1 ', '0.1 ', 'I. setosa'],
 ['5.8 ', '4.0 ', '1.2 ', '0.2 ', 'I. setosa'],
 ['5.7 ', '4.4 ', '1.5 ', '0.4 ', 'I. setosa'],
 ['5.4 ', '3.9 ', '1.3 ', '0.4 ', 'I. setosa'],
 ['5.1 ', '3.5 ', '1.4 ', '0.3 ', 'I. setosa'],
 ['5.7 ', '3.8 ', '1.7 ', '0.3 ', 'I. setosa'],
```

In [601]:
```
d = {h: [float(line[i]) for line in c] for i, h in enumerate(header[:-1])}
```

In [602]:
```
d.keys()
```

Out[602]:
```
dict_keys(['Sepal length', 'Sepal width', 'Petal length', 'Petal width'])
```

In [603]:
```
d['Sepal width']
```

Out[603]:
```
[3.5,
 3.0,
 3.2,
 3.1,
 3.6,
 3.9,
 3.4,
 3.4,
 2.9,
 3.1,
 3.7,
 3.4,
 3.0,
 3.0,
 4.0,
 4.4,
 3.9,
 3.5,
 3.8,
```

In [610]:
```
l = '-+++++++-'

while '+-' in l or '-+' in l:
    l = l.replace('+-', '')
    l = l.replace('-+', '')

print (l)
```

```
+++++
```

In [4]:
```
def f(s):
    for x in s:
        if not x in list('ACGT'):
            return False
    return len(s) % 3 == 0
```

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

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

In [15]:
```
import sys
sys.version
```

Out[15]:
```
'3.7.0 (default, Jun 28 2018, 07:39:16) \n[Clang 4.0.1 (tags/RELEASE_401/fina
l)]'
```

In [10]:
```
dir(sys)
```

Out[10]:
```
['__breakpointhook__',
 '__displayhook__',
 '__doc__',
 '__excepthook__',
 '__interactivehook__',
 '__loader__',
 '__name__',
 '__package__',
 '__spec__',
 '__stderr__',
 '__stdin__',
 '__stdout__',
 '_clear_type_cache',
 '_current_frames',
 '_debugmallocstats',
 '_framework',
 '_getframe',
 '_git',
 '_home',
 '_xoptions',
 'abiflags',
 'api_version',
 'argv',
 'base_exec_prefix',
 'base_prefix',
 'breakpointhook',
 'builtin_module_names',
 'byteorder',
 'call_tracing',
 'callstats',
 'copyright',
 'displayhook',
 'dont_write_bytecode',
 'exc_info',
 'excepthook',
 'exec_prefix',
 'executable',
 'exit',
 'flags',
 'float_info',
 'float_repr_style',
 'get_asyncgen_hooks',
 'get_coroutine_origin_tracking_depth',
 'get_coroutine_wrapper',
 'getallocatedblocks',
 'getcheckinterval',
 'getdefaultencoding',
 'getdlopenflags',
 'getfilesystemencodeerrors',
 'getfilesystemencoding',
 'getprofile',
 'getrecursionlimit',
 'getrefcount',
 'getsizeof',
 'getswitchinterval',
 'gettrace',
 'hash_info',
 'hexversion',
 'implementation',
 'int_info',
 'intern',
 'is_finalizing',
 'last_traceback',
 'last_type',
 'last_value',
 'maxsize',
```