In [12]:
```python
a = ['chr1', "chr2", "chr3", "chr11"]
```

In [2]:
```python
sorted(a)
```

Out[2]: `['chr1', 'chr11', 'chr2', 'chr3']`

In [3]:
```python
b = 'chr2'
```

In [5]:
```python
int(b[-1])
```

Out[5]: 2

In [21]:
```python
def f(x):
    if x[-2] in '0123456789':
        return int(x[-2:])
    return int(x[-1])
```

In [22]:
```python
b = list(map(f,a))
```

In [23]:
```python
b
```

Out[23]: `[1, 2, 3, 11]`

In [24]:
```python
c = list(zip(b,a))
```

In [26]:
```python
[x[1] for x in sorted(c)]
```

Out[26]: `['chr1', 'chr2', 'chr3', 'chr11']`

In [27]:
```python
for i in range(10):
    print (i)
```
```
0
1
2
3
4
5
6
7
8
9
```

In [28]:
```python
for i in ['a', 'b']:
    print (i)
```
```
a
b
```

In [30]:
```python
a=3
while a>0:
    print ("Hello:", a)
    a = a - 1
    # Όταν φτάνειο στο τέλος της λούπας ξαναπάει στη while !!!!
```

```
Hello: 3
Hello: 2
Hello: 1
```

In [31]:
```python
for i in [1,2,3]:

    print (i)
```

```
1
2
3
```

In [33]:
```python
for i in range(10):
    print (i)
```

```
0
1
2
3
4
5
6
7
8
9
```

In [35]:
```python
a=0
while a<10:
    print (a)
    a += 1
```

```
0
1
2
3
4
5
6
7
8
9
```

In [37]:
```python
a=0
while a<10:

    if a==5:
        a += 1
        continue

    print (a)
    a += 1
```

```
0
1
2
3
4
6
7
8
```

```
                    9
```

In [38]:
```python
a=0
while a<10:

    if a==5:
        break

    print (a)
    a += 1
```

```
0
1
2
3
4
```

In [41]:
```python
a=0
while a<10:

    if a==5:
        break

    print (a)
    a += 1
else:
    print ("DEN ekana break")
```

```
0
1
2
3
4
```

In [42]:
```python
a=0
while a<10:

    #if a==5:
    #    break

    print (a)
    a += 1
else:
    print ("DEN ekana break")
```

```
0
1
2
3
4
5
6
7
8
9
DEN ekana break
```

In [43]:
```python
a=1
for i in range(5):
    a -= 0.1*a
print (a)
```

```
0.5904900000000001
```

In [44]:
```python
height=1
c=0
while height > 0.5:
    height -= 0.1*height
    c = c + 1

print(c)
```

7

In [45]:
```python
print(height)
```

0.4782969

1+2+3+4+5+6+....

In [47]:
```python
s = 0
current = 0
while s < 1000:
    current += 1
    s += current

s
```

Out[47]: 1035

In [49]:
```python
current
```

Out[49]: 45

In [50]:
```python
sum(range(0, 46))
```

Out[50]: 1035

In [51]:
```python
sum(range(0, 45))
```

Out[51]: 990

In [72]:
```python
def is_prime(x):

    state = True
    for n in range(2, x):
        if x%n==0:
            state=False
    return state
```

In [74]:
```python
is_prime(23)
```

Out[74]: True

In [75]:
```python
is_prime(9)
```

Out[75]: False

```
In [78]:  def is_prime(x):


              for n in range(2, x):
                  if x%n==0:
                      return False

              return True
```

```
In [ ]:
```

```
In [79]:  def is_prime(x):

              state = True
              for n in range(2, x):
                  if x%n==0:
                      state=False
                      break

              return state
```

```
In [83]:  def is_prime_slow(x):

              state = True
              for n in range(2, x):
                  if x%n==0:
                      state=False
              return state
```

```
In [89]:  is_prime_slow(100_000_000)
```

```
Out[89]:  False
```

```
In [86]:  def is_prime_fast(x):

              state = True
              for n in range(2, x):
                  if x%n==0:
                      state=False
                      break

              return state
```

```
In [88]:  is_prime_fast(100_000_000)
```

```
Out[88]:  False
```

```python
In [90]: def is_prime_faster(x):

             state = True
             for n in range(2, int(x**0.5)+1):
                 if x%n==0:
                     state=False
                     break

             return state
```

```python
In [91]: # add prime number until the sum is greater than 1000000

         s=0
         c=1
         while s<1_000_000:
             if is_prime_fast(c):
                 s += c
             c += 1
```

```python
In [92]: s
```

Out[92]: 1001605

```python
In [93]: c
```

Out[93]: 3944

```python
In [94]: def f(x):
             return x/2, x*2
```

```python
In [96]: a = f(10)
```

```python
In [97]: print (a)
```

(5.0, 20)

```python
In [98]: type(a)
```

Out[98]: tuple

```python
In [99]: b = [5,20]
```

```python
In [100…]: print (b)
```

[5, 20]

```python
In [101…]: b[0]=70
```

```python
In [102…]: print(b)
```

[70, 20]

```python
In [103…]: a= (5,20)
```

```
In [104…   print (a)

           (5, 20)

In [105…   a[0] = 70

           ---------------------------------------------------------------------------
           TypeError                                 Traceback (most recent call last)
           <ipython-input-105-bb7e6a73b7ba> in <module>
           ----> 1 a[0] = 70

           TypeError: 'tuple' object does not support item assignment

In [106…   a

Out[106…   (5, 20)

In [107…   a[1]

Out[107…   20

In [108…   c = a[1]

In [109…   c += 10

In [110…   a= [1,2]

In [111…   b,c = a

In [112…   b

Out[112…   1

In [113…   c

Out[113…   2

In [114…   b,c = (1,2)
           print (b)
           print (c)

           1
           2

In [115…   def f(x):
               return x/2, x*2

In [118…   a = f(10)
           print(a)

           (5.0, 20)

In [119…   a,b = f(10)
           print (a)
           print (b)

           5.0
           20
```

In [120…
```python
5,
```

Out[120… `(5,)`

In [121…
```python
a= [1,2,3]
tuple(a)
```

Out[121… `(1, 2, 3)`

In [122…
```python
a = (1,2,3)
list(a)
```

Out[122… `[1, 2, 3]`

In [123…
```python
a=['mitsos', 'kostas', 'elenh']
b=[4,6,8]
```

In [124…
```python
for i,name in enumerate(a):
    if name=='elenh':
        print (b[i])
```
8

In [125…
```python
for thl, name in zip(b,a):
    if name=='elenh':
        print (thl)
```
8

In [126…
```python
b[a.index('elenh')]
```

Out[126… 8

In [127…
```python
d = {
    "mitsos": 4,
    "kostas": 6,
    "elenh": 8
}
```

In [128…
```python
type(d)
```

Out[128… dict

In [129…
```python
d['elenh']
```

Out[129… 8

In [130…
```python
len(d)
```

Out[130… 3

In [131…
```python
len({})
```

Out[131… 0

```
In [133… d
```

```
Out[133… {'mitsos': 4, 'kostas': 6, 'elenh': 8}
```

```
In [134… d['maria'] = 10
```

```
In [135… len(d)
```

```
Out[135… 4
```

```
In [136… d['maria']
```

```
Out[136… 10
```

```
In [137… del d['kostas']
```

```
In [138… d
```

```
Out[138… {'mitsos': 4, 'elenh': 8, 'maria': 10}
```

```
In [139… d['maria'] = 20
```

```
In [140… d
```

```
Out[140… {'mitsos': 4, 'elenh': 8, 'maria': 20}
```

```
In [141… d['george'] = {'t': 1}
```

```
In [142… d
```

```
Out[142… {'mitsos': 4, 'elenh': 8, 'maria': 20, 'george': {'t': 1}}
```

```
In [143… d[1] = 4
```

```
In [144… d
```

```
Out[144… {'mitsos': 4, 'elenh': 8, 'maria': 20, 'george': {'t': 1}, 1: 4}
```

```
In [145… d[False] = "mitsos"
```

```
In [146… d
```

```
Out[146… {'mitsos': 4,
          'elenh': 8,
          'maria': 20,
          'george': {'t': 1},
          1: 4,
          False: 'mitsos'}
```

```
In [147… d[5.5] = "kostas"
```

```
In [148… d[ [4,5] ] = 5
```

```
TypeError                                            Traceback (most recent call last)
<ipython-input-148-933332b3c719> in <module>
----> 1 d[ [4,5] ] = 5

TypeError: unhashable type: 'list'
```

In [149… `d[ (4,5) ] = 5`

In [150… `hash('mitsos')`

Out[150… 6714401743874183407

In [151… `hash((5,6,7))`

Out[151… -1350146935415579984

In [152… `hash('mitsos')`

Out[152… 6714401743874183407

In [153…
```python
d = {
    "mitsos": 4,
    "kostas": 6,
    "elenh": 8
}
```

In [154… `'mitsos' in d`

Out[154… True

In [155… `'george' in d`

Out[155… False

In [157… `list(d.keys())`

Out[157… ['mitsos', 'kostas', 'elenh']

In [158… `list(d.values())`

Out[158… [4, 6, 8]

In [160… `6 in d.values()`

Out[160… True

In [161… `3 in d.values()`

Out[161… False

In [162…
```python
d = {
    "mitsos": 4,
    "kostas": 6,
    "elenh": 8
}
```

```
In [163…   a = [4,5,6]

           for x in a:
               print (x)
```

```
4
5
6
```

```
In [164…   d = {
               "mitsos": 4,
               "kostas": 6,
               "elenh": 8
           }

           for x in d:
               print (x)
```

```
mitsos
kostas
elenh
```

```
In [165…   for x in d:
               print (x, d[x])
```

```
mitsos 4
kostas 6
elenh 8
```

```
In [166…   for k,v in d.items():
               print (k,v)
```

```
mitsos 4
kostas 6
elenh 8
```

```
In [167…   list(d.items())
```

```
Out[167…   [('mitsos', 4), ('kostas', 6), ('elenh', 8)]
```

```
In [168…   t = [('mitsos', 4), ('kostas', 6), ('elenh', 8)]
```

```
In [169…   dict(t)
```

```
Out[169…   {'mitsos': 4, 'kostas': 6, 'elenh': 8}
```

```
In [170…   dict([5,6,7])
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-170-624a4c102ded> in <module>
----> 1 dict([5,6,7])

TypeError: cannot convert dictionary update sequence element #0 to a sequence
```

```
In [171…   a=[5,6,7]
```

```
In [172…  d={}

          for x in a:
              d[x] = 2*x
          print (d)
```

```
{5: 10, 6: 12, 7: 14}
```

```
In [173…  {x:2*x for x in a } # <--- dictionary Comprehenesion
```

```
Out[173…  {5: 10, 6: 12, 7: 14}
```

sets

```
In [174…  a=[1,2,3,2,3,4,3,5,4,6,7,6,5,6,7,8]
```

```
In [175…  set(a)
```

```
Out[175…  {1, 2, 3, 4, 5, 6, 7, 8}
```

```
In [176…  a = {1,2,3,4,5}
```

```
In [177…  a=set([1,2,3,4,5])
```

```
In [178…  a
```

```
Out[178…  {1, 2, 3, 4, 5}
```

```
In [179…  a = {1,2,3,4}
          b = {3,4,5,6}
```

```
In [180…  a.union(b)
```

```
Out[180…  {1, 2, 3, 4, 5, 6}
```

```
In [182…  a | b
```

```
Out[182…  {1, 2, 3, 4, 5, 6}
```

```
In [185…  a.intersection(b)
```

```
Out[185…  {3, 4}
```

```
In [186…  a & b
```

```
Out[186…  {3, 4}
```

```
In [187…  a - b
```

```
Out[187…  {1, 2}
```

```
In [188…  b - a
```

Out[188…　{5, 6}

In [189…
```python
(a - b)  | (b - a)
```

Out[189…　{1, 2, 5, 6}

In [190…
```python
a
```

Out[190…　{1, 2, 3, 4}

In [191…
```python
b
```

Out[191…　{3, 4, 5, 6}

In [192…
```python
a.add(7)
```

In [193…
```python
a
```

Out[193…　{1, 2, 3, 4, 7}

In [194…
```python
a - {7}
```

Out[194…　{1, 2, 3, 4}

In [195…
```python
len(a)
```

Out[195…　5

In [197…
```python
len(set())
```

Out[197…　0

In [198…
```python
a = {1,2}
```

In [199…
```python
a = set()
```

In [200…
```python
a
```

Out[200…　set()

In [201…
```python
a = {1, 2, 3, 4, 7}
```

In [203…
```python
for x in a:
    print (x)
```
```
1
2
3
4
7
```

In [204…
```python
list(a)
```

Out[204…　[1, 2, 3, 4, 7]

In [205…
```python
set('alskdjfhasdlkjfhgaslkdjfghsdlkjfghsldkfghsdlkfjghsldkfjghaldkfgh')
```

Out[205… `{'a', 'd', 'f', 'g', 'h', 'j', 'k', 'l', 's'}`

In [206…
```python
[x%4 for x in range(10)]
```

Out[206… `[0, 1, 2, 3, 0, 1, 2, 3, 0, 1]`

In [207…
```python
{x%4 for x in range(10)}
```

Out[207… `{0, 1, 2, 3}`

In [208…
```python
set([x%4 for x in range(10)])
```

Out[208… `{0, 1, 2, 3}`

In [209…
```python
a=[1,2,3,2,3,4,3,4,5,4,6,7,8,7,8,9,8,7,6,5,3,2]
```

In [217…
```python
d = {}
for x in a:
    if not x in d:
        d[x]=0

    d[x] += 1

print (d)
```

```
{1: 1, 2: 3, 3: 4, 4: 3, 5: 2, 6: 2, 7: 3, 8: 3, 9: 1}
```

In [214…
```python
d[100]
```

```
---------------------------------------------------------------------------
KeyError                                  Traceback (most recent call last)
<ipython-input-214-5a6d8be5c86f> in <module>
----> 1 d[100]

KeyError: 100
```

In [215…
```python
100 in d
```

Out[215… `False`

In [216…
```python
d.get(100, "mitsos")
```

Out[216… `'mitsos'`

In [218…
```python
d.get(7, "mitsos")
```

Out[218… `3`

In [219…
```python
a = {4,5,6,7,7}
```

In [220…
```python
sorted(a)
```

Out[220… `[4, 5, 6, 7]`

```
In [221…   a.sort()
```

```
           ---------------------------------------------------------------------------
           AttributeError                                Traceback (most recent call last)
           <ipython-input-221-2ed0d7de6146> in <module>
           ----> 1 a.sort()

           AttributeError: 'set' object has no attribute 'sort'
```

```
In [222…   sorted(set("s.,djgfhaslkdjghfaslekgfjW;LKDJGHjrihtarejKRJFGHLSKDRFGJSLKDFJGHL$
```

```
Out[222…   [',',
            '.',
            ';',
            'D',
            'F',
            'G',
            'H',
            'J',
            'K',
            'L',
            'R',
            'S',
            'W',
            'a',
            'd',
            'e',
            'f',
            'g',
            'h',
            'i',
            'j',
            'k',
            'l',
            'r',
            's',
            't']
```

```
In [223…   set('mitsos')
```

```
Out[223…   {'i', 'm', 'o', 's', 't'}
```

```
In [225…   a=[5,6,4,7,3,8,5,7,]
```

```
In [226…   a = [[1,2,3], [6,5,6,7,], [3,2]]
```

```
In [228…   a.index([3,2])
```

```
Out[228…   2
```

In [229...
```python
pop_A = [
        ['M1', 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1, 1, 2, 1, 0, 1, 1, 1, 0, 1],
        ['M2', 0, 0, 1, 1, 0, 1, 0, 0, 0, 0, 2, 0, 0, 0, 1, 0, 0, 0, 1, 0],
        ['M3', 1, 1, 1, 0, 0, 2, 0, 0, 1, 0, 0, 0, 0, 0, 0, 2, 1, 0, 2, 1],
        ['M4', 1, 1, 0, 0, 0, 0, 1, 2, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0],
        ['M5', 0, 0, 2, 2, 0, 0, 0, 1, 0, 0, 1, 1, 0, 0, 0, 0, 0, 2, 0, 2],
        ['M6', 0, 0, 1, 0, 2, 0, 0, 0, 1, 1, 2, 2, 2, 0, 0, 0, 1, 0, 0, 0],
        ['M7', 0, 0, 2, 1, 1, 1, 0, 2, 1, 0, 1, 0, 1, 1, 0, 0, 1, 0, 1, 0],
        ['M8', 0, 1, 0, 1, 1, 0, 1, 0, 0, 0, 0, 0, 1, 1, 1, 1, 2, 0, 0, 2],
        ['M9', 0, 0, 1, 0, 0, 1, 2, 1, 0, 0, 1, 1, 1, 1, 0, 2, 1, 0, 2, 1],
        ['M10', 0, 0, 0, 0, 1, 0, 0, 1, 0, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1]
    ]
```

In [233...
```python
max([ (x[1:].count(2),x[0] ) for x in pop_A])[1]
```

Out[233... 'M6'

In [235...
```python
m = 0

for x in pop_A:
    c = x[1:].count(2)
    if c >= m:
        m = c
        name = x[0]
print (name)
```

M6

In [ ]: