DUT STID, Université de la Côte d'Azur

Bases de données avancées

Python

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Types de données

In [143]:

```
first_appearance = 1971
type(first_appearance)
```

Out[143]:

```
int
```

In [144]:

```
weight = 71.6
type(weight)
```

Out[144]:

```
float
```

In [145]:

```
type(True)
```

Out[145]:

```
bool
```

In [146]:

```
3+5
```

Out[146]:

```
8
```

In [147]:

```
7/5
```

Out[147]:

1.4

In [148]:

```
7//5
```

Out[148]:

1

In [149]:

```
5 % 2
```

Out[149]:

1

In [150]:

```
3 ** 5
```

Out[150]:

243

Listes

In [151]:

```
iron_man = ['Iron Man',
            'Tony Stark',
            'Long Island, New York',
            'Marvel Comics',
            198.51,
            191.85,
            'M',
            1963,
            'Blue',
            'Black',
            85,
           'high']

type(iron_man)
```

Out[151]:

list

In [152]:

```
iron_man[1]
```

Out[152]:

```
'Tony Stark'
```

In [153]:

```
iron_man[-2]
```

Out[153]:

```
85
```

In [154]:

```
iron_man[4:6]
```

Out[154]:

```
[198.51, 191.85]
```

In [155]:

```
names = ['Aquaman', 'Ant-Man', 'Batman', 'Black Widow',
         'Captain America', 'Daredavil', 'Elektra', 'Flash',
         'Green Arrow', 'Human Torch', 'Hancock', 'Iron Man',
         'Mystique', 'Professor X', 'Rogue', 'Superman',
         'Spider-Man', 'Thor', 'Northstar']
```

In [156]:

```
'Thing' in names
```

Out[156]:

```
False
```

In [157]:

```
del names[0]
```

In [158]:

```
len(names)
```

Out[158]:

```
18
```

In [159]:

```
names.sort()
```

In [160]:

```
names[-5:]
```

Out[160]:

```
['Professor X', 'Rogue', 'Spider-Man', 'Superman', 'Thor']
```

In [161]:

```
names.sort(reverse=True)
```

In [162]:

```
prochain_entier = lambda n: n+1
prochain_entier(9)
```

Out[162]:

```
10
```

In [163]:

```
names.sort(key=lambda n:len(n))
names
```

Out[163]:

```
['Thor',
 'Rogue',
 'Flash',
 'Batman',
 'Hancock',
 'Elektra',
 'Ant-Man',
 'Superman',
 'Mystique',
 'Iron Man',
 'Northstar',
 'Daredavil',
 'Spider-Man',
 'Professor X',
 'Human Torch',
 'Green Arrow',
 'Black Widow',
 'Captain America']
```

In [164]:

```
names.insert(4, 'Aquaman')
names[:6]
```

Out[164]:

```
['Thor', 'Rogue', 'Flash', 'Batman', 'Aquaman', 'Hancock']
```

Tuples

In [165]:

```
rogue = ('Rogue',
         'Anna Marie',
         'Caldecott County, Mississippi',
         'Marvel Comics',
         173.1,
         54.39,
         'F',
         1981,
         'Green',
         'Brown / White',
         10,
        'good')
```

In [166]:

```
try:
    rogue[-2] = 70
except TypeError:
    print("On ne peut pas changer les éléments d'une tuple")
```

```
On ne peut pas changer les éléments d'une tuple
```

Chaînes de caractères

In [167]:

```
name = rogue[1]
name[3]
```

Out[167]:

```
'a'
```

Ensembles

In [168]:

```
fantastic_4 = {'Mr. Fantastic', 'Invisible woman', 'Human torch', 'Thing'}
'Thing' in fantastic_4
```

Out[168]:

```
True
```

Dictionnaires

In [169]:

```
rogue = {'name': 'Rogue',
         'identity': 'Anna Marie',
         'birth_place': 'Caldecott County, Mississippi',
         'publisher': 'Marvel Comics',
         'height': 173.1,
         'weight': 54.39,
         'gender': 'F',
         'first_appearance': 1981,
         'eye_color': 'Green',
         'hair_color': 'Brown / White',
         'strength': 10,
         'intelligence': 'good'}
```

In [170]:

```
rogue['identity']
```

Out[170]:

```
'Anna Marie'
```

Comprehénsions

In [171]:

```
[2*i+1 for i in range(10)]
```

Out[171]:

```
[1, 3, 5, 7, 9, 11, 13, 15, 17, 19]
```

In [172]:

```
[2*i+1 for i in range(100) if (2*i+1)**(1/2)==int((2*i+1)**(1/2))]
```

Out[172]:

```
[1, 9, 25, 49, 81, 121, 169]
```

In [3]:

```
[2*i+1 for i in range(20000) if (2*i+1)**(1/3)==int((2*i+1)**(1/3))]
```

Out[3]:

```
[1, 27]
```

In [5]:

```
i = 9841
```

In [6]:

```
(2*i+1)**(1/3)
```

Out[6]:

```
26.999999999999996
```

In [175]:

```
{i for i in range(10)}
```

Out[175]:

```
{0, 1, 2, 3, 4, 5, 6, 7, 8, 9}
```

In [176]:

```
{i: i**2 for i in range(10)}
```

Out[176]:

```
{0: 0, 1: 1, 2: 4, 3: 9, 4: 16, 5: 25, 6: 36, 7: 49, 8: 64, 9: 81}
```

Structures de contrôle

In [177]:

```
names = ['Aquaman', 'Ant-Man', 'Batman', 'Black Widow',
         'Captain America', 'Daredavil', 'Elektra', 'Flash',
         'Green Arrow', 'Human Torch', 'Hancock', 'Iron Man',
         'Mystique', 'Professor X', 'Rogue', 'Superman',
         'Spider-Man', 'Thor', 'Northstar']

years = [1941, 1962, None, None, 1941,
         1964, None, 1940, 1941, 1961,
         None, 1963, None, 1963, 1981,
         None, None, 1962, 1979]

counts = {}
for y in years:
    if y in counts:
        counts[y] += 1
    else:
        counts[y] = 1
```

In [178]:

```
pairs = list(counts.items())
sorted(pairs, key=lambda p:p[1], reverse=True)
```

Out[178]:

```
[(None, 7),
 (1941, 3),
 (1962, 2),
 (1963, 2),
 (1964, 1),
 (1940, 1),
 (1961, 1),
 (1981, 1),
 (1979, 1)]
```

Fonctions et routines

In [179]:

```
def get_sorted_counts(sequence):
    counts = {}

    for x in sequence:
        if x in counts:
            counts[x] += 1
        else:
            counts[x] = 1

    pairs = counts.items()
    return sorted(pairs, key=lambda p:p[1], reverse=True)

get_sorted_counts(years)
```

Out[179]:

```
[(None, 7),
 (1941, 3),
 (1962, 2),
 (1963, 2),
 (1964, 1),
 (1940, 1),
 (1961, 1),
 (1981, 1),
 (1979, 1)]
```

Importer des modules

In [180]:

```
from collections import defaultdict
def get_sorted_counts(sequence):
    counts = defaultdict(int)

    for x in sequence:
        counts[x] += 1

    pairs = counts.items()
    return sorted(pairs, key=lambda p:p[1], reverse=True)
```

In [181]:

```
get_sorted_counts(years)
```

Out[181]:

```
[(None, 7),
 (1941, 3),
 (1962, 2),
 (1963, 2),
 (1964, 1),
 (1940, 1),
 (1961, 1),
 (1981, 1),
 (1979, 1)]
```

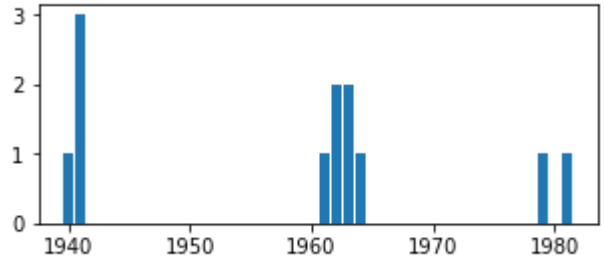
In [182]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

Réaliser des diagrammes

In [183]:

```
x, y = np.array(get_sorted_counts(years)[1:]).transpose()
%matplotlib inline
plt.figure(figsize=(5.0, 2.0))
plt.bar(x, y)
plt.show()
```



Lire un fichier

In [184]:

```
import csv

with open('heroes.csv', 'r') as heroes_file:
    heroes_reader = csv.reader(heroes_file, delimiter=';', quotechar='"')
    heroes = list(heroes_reader)[1:]
```

In [185]:

```
heroes[:4]
```

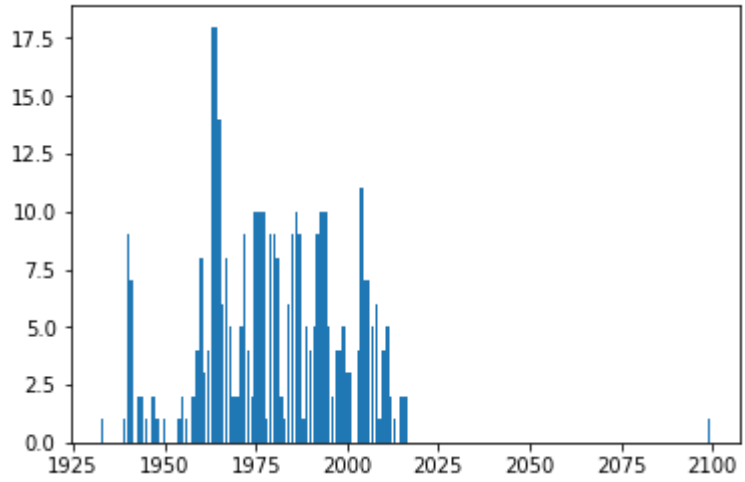
Out[185]:

```
[['A-Bomb',
  'Richard Milhouse Jones',
  'Scarsdale, Arizona',
  'Marvel Comics',
  '203.21000000000001',
  '441.94999999999999',
  'M',
  '2008',
  'Yellow',
  'No Hair',
  '100',
  'moderate'],
 ['Abraxas',
  'Abraxas',
  'Within Eternity ',
  'Marvel Comics',
  '',
  '',
  'M',
  '',
  'Blue',
  'Black',
  '100',
  'high'],
 ['Abomination',
  'Emil Blonsky',
  'Zagreb, Yugoslavia',
  'Marvel Comics',
  '203.03999999999999',
  '441.98000000000002',
  'M',
  '',
  'Green',
  'No Hair',
  '80',
  'good'],
 ['Adam Monroe',
  '',
  '',
  'NBC - Heroes',
  '',
  '',
  'M',
  '',
  'Blue',
  'Blond',
  '10',
  'good']]
```

In [186]:

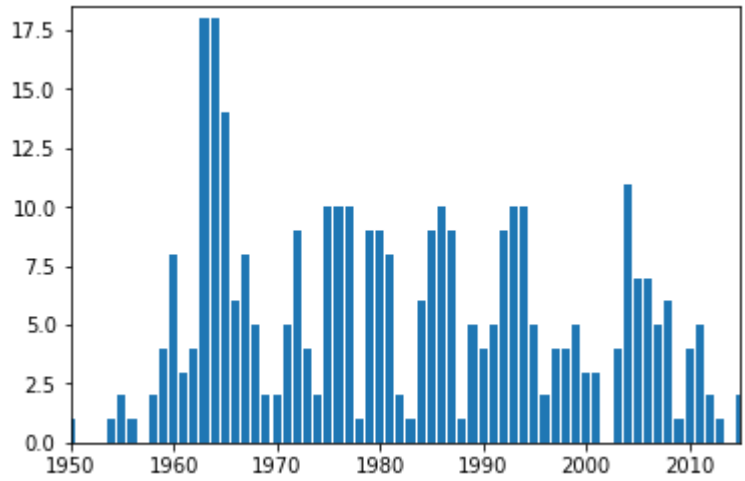
```
years = [int(h[7]) for h in heroes if h[7]]

counts = get_sorted_counts(years)
x, y = np.array(counts).transpose()
plt.bar(x, y)
plt.show()
```



In [187]:

```
plt.bar(x, y)
plt.xlim((1950, 2015))
plt.ylim((0, 18.5))
plt.show()
```



Utiliser pandas

In [108]:

```
heroes_df = pd.DataFrame(heroes)
heroes_df.head()
```

Out[108]:

	0	1	2	3	4	5	6	7	8
0	A-Bomb	Richard Milhouse Jones	Scarsdale, Arizona	Marvel Comics	203.21000000000001	441.94999999999999	M	2008	Yellow
1	Abraxas	Abraxas	Within Eternity	Marvel Comics			M		Blue
2	Abomination	Emil Blonsky	Zagreb, Yugoslavia	Marvel Comics	203.03999999999999	441.98000000000002	M		Green
3	Adam Monroe			NBC - Heroes			M		Blue
4	Agent 13	Sharon Carter		Marvel Comics	173.41	61.030000000000001	F		Blue

In [110]:

```
heroes = pd.read_csv('heroes.csv', sep=';', index_col=0)
heroes.head()
```

Out[110]:

Name	Identity	Birth place	Publisher	Height	Weight	Gender	First appearance	Eye color	Hair color	Strengt
A-Bomb	Richard Milhouse Jones	Scarsdale, Arizona	Marvel Comics	203.21	441.95	M	2008.0	Yellow	No Hair	100.
Abraxas	Abraxas	Within Eternity	Marvel Comics	NaN	NaN	M	NaN	Blue	Black	100.
Abomination	Emil Blonsky	Zagreb, Yugoslavia	Marvel Comics	203.04	441.98	M	NaN	Green	No Hair	80.
Adam Monroe	NaN	NaN	NBC - Heroes	NaN	NaN	M	NaN	Blue	Blond	10.
Agent 13	Sharon Carter	NaN	Marvel Comics	173.41	61.03	F	NaN	Blue	Blond	Nal

In [125]:

```
heroes.loc['Professor X']
```

Out[125]:

```
Identity            Charles Francis Xavier
Birth place             New York, New York
Publisher                    Marvel Comics
Height                              183.74
Weight                               86.89
Gender                                   M
First appearance                      1963
Eye color                             Blue
Hair color                         No Hair
Strength                                10
Intelligence                          high
Name: Professor X, dtype: object
```

In [126]:

```
heroes.loc['Professor X']['Publisher']
```

Out[126]:

```
'Marvel Comics'
```

In [127]:

```
heroes.at['Professor X', 'Publisher']
```

Out[127]:

```
'Marvel Comics'
```

In [111]:

```
heroes['Gender']
```

Out[111]:

```
Name
A-Bomb               M
Abraxas              M
Abomination          M
Adam Monroe          M
Agent 13             F
Air-Walker           M
Agent Bob            M
Abe Sapien           M
Abin Sur             M
Angela               F
Animal Man           M
Agent Zero           M
Colin Wagner         M
Angel Dust           F
Angel Salvadore      F
Zoom                 M
Lady Deathstrike     F
Yoda                 M
Zatanna              F
Yellowjacket II      F
Yellowjacket         M
Yellow Claw          M
Absorbing Man        M
X-Man                M
X-23                 F
Wondra               F
Adam Strange         M
Wonder Girl          F
Wonder Woman         F
Wolverine            M
                    ..
Ardina               F
Arclight             F
Ares                 M
Archangel            M
Astro Boy            M
Atom III             M
Aqualad              M
Ariel                F
Aquababy             M
Aquaman              M
Apocalypse           M
Anti-Monitor         M
Ant-Man II           M
Anti-Venom           M
Anti-Spawn           M
Annihilus            M
Angel                M
Ammo                 M
Arachne              F
Angel                M
Allan Quatermain     M
Alien                M
```

```
Alfred Pennyworth    M
Ando Masahashi       M
Alex Woolsly         M
Alan Scott           M
Amazo                M
Ant-Man              M
Ajax                 M
Alex Mercer          M
Name: Gender, Length: 735, dtype: object
```

In [115]:

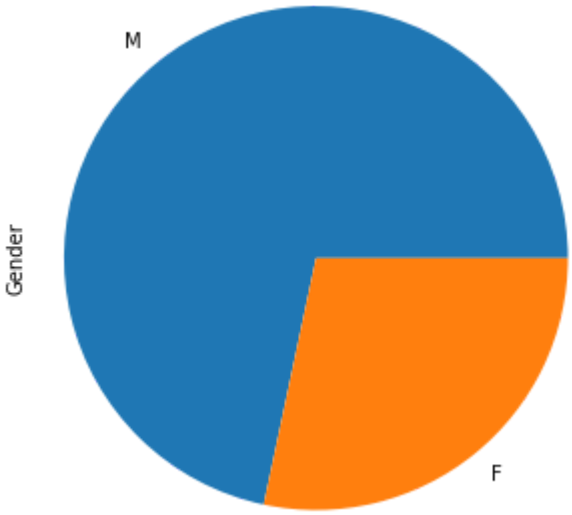
```
heroes['Gender'].value_counts()
```

Out[115]:

```
M    506
F    200
Name: Gender, dtype: int64
```

In [124]:

```
plt.figure(figsize=(5, 5))
heroes['Gender'].value_counts().plot.pie()
plt.axis('equal')
plt.show()
```



In [131]:

```
heroes_with_year = heroes[heroes['First appearance'] > 2000]
heroes_with_year.head()
```

Out[131]:

Name	Identity	Birth place	Publisher	Height	Weight	Gender	First appearance	Eye color	Hair color	Strength
A-Bomb	Richard Milhouse Jones	Scarsdale, Arizona	Marvel Comics	203.21	441.95	M	2008.0	Yellow	No Hair	100.0
Agent Bob	Bob	NaN	Marvel Comics	178.25	81.45	M	2007.0	Brown	Brown	10.0
Angel Salvadore	Angel Salvadore Bohusk	NaN	Marvel Comics	163.57	54.67	F	2001.0	Brown	Black	10.0
Winter Soldier	Bucky Barnes	NaN	Marvel Comics	175.21	117.21	M	2005.0	Brown	Brown	35.0
Violet Parr	Violet Parr	NaN	Dark Horse Comics	137.18	41.13	F	2004.0	Violet	Black	10.0

In [ ]:

```
```