Python 3 Cheat Sheet

Latest version on :
https://perso.limsi.fr/pointal/python:memento

Base Types

integer, float, boolean, string, bytes

```
  int 783   0  -192   0b010  0o642  0xF3
            zero      binary octal  hexa
float 9.23 0.0   -1.7e-6
                      ×10⁻⁶
 bool True  False
  str "One\nTwo"        Multiline string:
      escaped new line   """X\tY\tZ
      'I\'m'             1\t2\t3"""
      escaped '          escaped tab
bytes b"toto\xfe\775"
      hexadecimal octal
```

☝ immutables

Container Types

▪ **ordered sequences**, fast index access, repeatable values

```
       list [1,5,9]   ["x",11,8.9]    ["mot"]   []
      tuple (1,5,9)    11,"y",7.4     ("mot",)  ()
```

Non modifiable values (immutables) ☝ expression with only comas → **tuple**

`str bytes` *(ordered sequences of chars / bytes)* `""` `b""`

▪ **key containers**, no *a priori* order, fast key access, each key is unique

```
dictionary  dict {"key":"value"}      dict(a=3,b=4,k="v")     {}
(key/value associations) {1:"one",3:"three",2:"two",3.14:"π"}
collection   set {"key1","key2"}      {1,9,3,0}           set()
```

☝ keys=hashable values (base types, immutables…) **frozenset** immutable set *empty*

Identifiers

for variables, functions, modules, classes… names

`a…zA…Z_` followed by `a…zA…Z_0…9`
- ▫ diacritics allowed but should be avoided
- ▫ language keywords forbidden
- ▫ lower/UPPER case discrimination

☺ `a toto x7 y_max BigOne`
☹ ~~`8y and for`~~

Variables assignment

`=`

☝ assignment ⇔ **binding** of a *name* with a *value*
1) evaluation of right side expression value
2) assignment in order with left side names

```
x=1.2+8+sin(y)
a=b=c=0        assignment to same value
y,z,r=9.2,-7.6,0  multiple assignments
a,b=b,a        values swap
a,*b=seq  ⎫ unpacking of sequence in
*a,b=seq  ⎭ item and list
x+=3           increment ⇔ x=x+3        and
x-=2           decrement ⇔ x=x-2        *=
x=None         « undefined » constant value  /=
del x          remove name x            %=
                                        …
```

Conversions

type (*expression*)

```
int("15") → 15
int("3f",16) → 63        can specify integer number base in 2nd parameter
int(15.56) → 15          truncate decimal part
float("-11.24e8") → -1124000000.0
round(15.56,1)→ 15.6     rounding to 1 decimal (0 decimal → integer number)
bool(x)  False for null x, empty container x , None or False x ; True for other x
str(x)→ "…"   representation string of x for display (cf. formatting on the back)
chr(64)→'@'  ord('@')→64        code ↔ char
repr(x)→ "…"  literal representation string of x
bytes([72,9,64]) → b'H\t@'
list("abc") → ['a','b','c']
dict([(3,"three"),(1,"one")]) → {1:'one',3:'three'}
set(["one","two"]) → {'one','two'}
separator str and sequence of str → assembled str
   ':'.join(['toto','12','pswd']) → 'toto:12:pswd'
str splitted on whitespaces → list of str
   "words with  spaces".split() → ['words','with','spaces']
str splitted on separator str → list of str
   "1,4,8,2".split(",") → ['1','4','8','2']
sequence of one type → list of another type (via list comprehension)
   [int(x) for x in ('1','29','-3')] → [1,29,-3]
```

Sequence Containers Indexing

for lists, tuples, strings, bytes…

```
negative index  -5   -4   -3   -2   -1
positive index   0    1    2    3    4
       lst=[10,  20,  30,  40,  50]
positive slice 0    1    2    3    4    5
negative slice -5   -4   -3   -2   -1
```

Items count
`len(lst)→5`
☝ **index from 0**
(here from 0 to 4)

Individual access to **items** via `lst[`*index*`]`

```
lst[0]→10    ⇒ first one    lst[1]→20
lst[-1]→50   ⇒ last one     lst[-2]→40
```

On mutable sequences (`list`), remove with `del lst[3]` *and modify with assignment* `lst[4]=25`

Access to **sub-sequences** via `lst[`*start slice*`:`*end slice*`:`*step*`]`

```
lst[:-1]→[10,20,30,40]  lst[::-1]→[50,40,30,20,10]  lst[1:3]→[20,30]     lst[:3]→[10,20,30]
lst[1:-1]→[20,30,40]    lst[::-2]→[50,30,10]        lst[-3:-1]→[30,40]   lst[3:]→[40,50]
lst[::2]→[10,30,50]     lst[:]→[10,20,30,40,50] shallow copy of sequence
```

Missing slice indication → from start / up to end.
On mutable sequences (`list`), remove with `del lst[3:5]` *and modify with assignment* `lst[1:4]=[15,25]`

Boolean Logic

Comparisons : `< > <= >= == !=`
(boolean results) ≤ ≥ = ≠

`a and b` logical and — *both simulta--neously*
`a or b` logical or — *one or other or both*

☝ pitfall : `and` *and* `or` *return value of* `a` *or of* `b` *(under shortcut evaluation).*
⇒ ensure that `a` *and* `b` *are booleans.*

`not a` logical not

`True` `False` } True and False constants

Statements Blocks

```
parent statement:
    statement block 1…
        ⁝
    parent statement:
        statement block2…
            ⁝
next statement after block 1
```

indentation !

☝ *configure editor to insert 4 spaces in place of an indentation tab.*

Modules/Names Imports

module `truc`⇔*file* `truc.py`

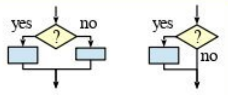
```
from monmod import nom1,nom2 as fct
```
→*direct access to names, renaming with* `as`
```
import monmod
```
→*access via* `monmod.nom1` …

☝ modules and packages searched in *python path* (cf `sys.path`)

Conditional Statement

statement block executed only if a condition is true

```
if logical condition:
    statements block
```



Can go with several *elif*, *elif*... and only one final *else*. Only the block of first true condition is executed.

```
if age<=18:
    state="Kid"
elif age>65:
    state="Retired"
else:
    state="Active"
```

☝ *with a var* `x`*:*
```
if bool(x)==True:  ⇔ if x:
if bool(x)==False: ⇔ if not x:
```

Maths

☝ *floating numbers… approximated values*

Operators: `+ - * / // % **`
Priority `(…)` × ÷ ↑ integer ÷ ↑ remainder a^b

`@` → matrix × *python3.5+*`numpy`

```
(1+5.3)*2→12.6
abs(-3.2)→3.2
round(3.57,1)→3.6
pow(4,3)→64.0
```
☝ *usual order of operations*

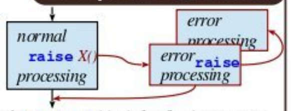
angles in radians

```
from math import sin,pi…
sin(pi/4)→0.707…
cos(2*pi/3)→-0.4999…
sqrt(81)→9.0     √
log(e**2)→2.0
ceil(12.5)→13
floor(12.5)→12
```

modules `math`, `statistics`, `random`, `decimal`, `fractions`, `numpy`, *etc. (cf. doc)*

Exceptions on Errors

Signaling an error:
```
    raise ExcClass(…)
```
Errors processing:
```
try:
    normal procesing block
except Exception as e:
    error processing block
```



☝ `finally` *block for final processing in all cases.*