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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`
☹ ~~`for 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
x-=2             decrement ⇔ x=x-2
x=None           « undefined » constant value
del x            remove name x
```

and `*=` `/=` `%=` …

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 simultaneously*

`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
```

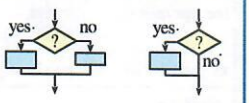
→*access via* `monmod.nom1` …

🗎 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
```

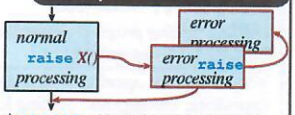
modules `math`, `statistics`, `random`, `decimal`, `fractions`, `numpy`, *etc. (cf. doc)*

Exceptions on Errors

Signaling an error:
`raise` *ExcClass(…)*

Errors processing:

```
try:
    → normal procesising block
except Exception as e:
    → error processing block
```



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