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` ($\times 10^{-6}$)

bool `True` `False`

str `"One\nTwo"` — *escaped new line*
`'I\'m'` — *escaped '*

Multiline string:
```
"""X\tY\tZ
1\t2\t3"""
```
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` `*a,b=seq`	*unpacking of sequence in 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) ≤ ≥ = ≠

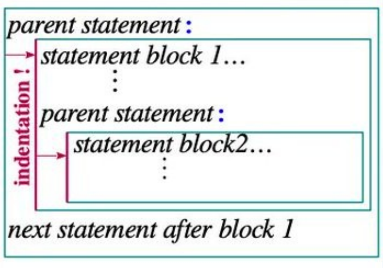
`a and b` logical and *both simulta--neously*
`a or b` logical or *one or other or both*

☝ 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
```

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

Maths

☝ *floating numbers… approximated values* *angles in radians*

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

Priority `(…)`

`@` → 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*

```
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)*

Modules/Names Imports

module `truc`⇔*file* `truc.py`

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

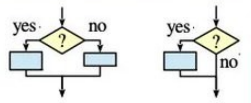
`import monmod` →*access via* `monmod.nom1` *…*

☝ 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.

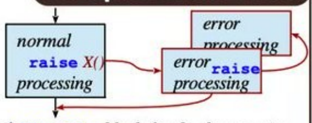
```
if age<=18:
    state="Kid"
elif age>65:
    state="Retired"
else:
    state="Active"
```

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

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.*