Python 2.5 Reference Card

(c) 2009 Michael Goerz <goerz@physik.fu-berlin.de>
http://www.physik.fu-berlin.de/~goerz/

1 Variable Types

1.1 Numbers

`42 052 0x2A 42L 052L 0x2AL`	42 (dec, oct, hex, short/long)
`0.2  .8  4.  1.e10  1.0e-7`	floating point value
`z = 5.0 – 2.0J;`	complex number
`z = complex(real, imag)`	complex number
`z.real; z.imag`	real and imag part of z
`True; False`	constants for boolean values
`abs(n)`	absolute value of n
`divmod(x, y)`	`(x/y, x%y)`
`hex(n)`	create hex string
`oct(n)`	create octal string
`ord(c)`	unicode code point of char
`round(x,n)`	round x to n decimal places
`cmp(x,y)`	x<y: -1, x==y: 0, x>y: 1
`coerce(x, y)`	`(x,y)`, make same type
`pow(x,y,z)`	`(x**y) % z`
`float("3.14")`	`float from string`
`int("42", base)`	`int from string`
`import math; import cmath`	more math functions
`import random;`	random number generators

1.2 Sequences (lists are mutable, tuples and strings are immutable)

`s=l=[1, "bla", [1+2J, 1.4], 4]`	list creation
`s=t=(1, "bla", [1+2J, 1.4], 4)`	tuple creation
`l=list(t); t=tuple(l)`	list/tuple conversion
`l=range(1000)`	list of integers (0-999)
`s=xrange(1000)`	immut. xrange-sequence
`i=iter(s); i.next()`	iterator from sequence
`s[2][0]`	get list element (1+2J)
`s[-2][-1]`	get list element (1.4)
`s1+s1`	sequence concat
`n*s1`	repeat `s1` `n` times
`s[i:j]; s[i:]; s[:j]`	slicing (`i` incl., `j` excl.)
`s[i:j:k]`	slice with stride `k`
`s[::2]; s[::-1]`	every 2nd Element / reverse `s`
`x in s; x not in s`	is `x` a member of `s`?
`len(s)`	number of elements
`min(s); max(s)`	min/max
`l[i:j]=['a','b','c','d']`	replace slice
`l[i:i]=['a','b']`	insert before position `i`
`l.count(x)`	number of occurances of `x`
`l.index(x)`	first index of `x`, or error
`l.append(x)`	append `x` at end of `l`
`x=l.pop()`	pop off last element
`l.extend(l2)`	append `l2` at end of `l`
`l.insert(i,x)`	instert `x` at pos. `i`
`l.remove(x)`	delete first `x`
`l.reverse()`	reverse `l`
`l.sort(f)`	sort using `f` (default `f` =`cmp`)
`zip(s,t,...)`	`[(s[0],t[0],...),..]`

1.3 Dictionaries (Mappings)

`d={'x':42, 'y':3.14, 'z':7}`	dict creation
`d['x']`	get entry for 'x'
`len(d)`	number of keys
`del(d['x'])`	delete entry from dict
`d.copy()`	create shallow copy
`d.has_key(k)`	does key exist?
`d.items()`	list of all items
`d.keys()`	list of all keys
`d.values()`	list of all values
`i=d.iteritems(); i.next()`	iterator over items
`i=d.iterkeys(); i.next()`	iterator over keys
`i=d.itervalues(); i.next()`	iterator over values
`d.get(k,x)`	get entry for k, or return x
`d.clear()`	remove all items
`d.setdefault(k,x)`	return d[k] or set d[k]=x
`d.popitem()`	return and delete an item

1.4 Sets

`s=set(s); fs=frozenset(s)`	create set
`fs.issubset(t); s<=t`	all `s` in `t`?
`fs.issuperset(t); s>=t`	all `t` in `s`?
`fs.union(t); s|t`	all elements from `s` and `t`
`fs.intersection(t); s&t`	elements both in `s` and `t`
`fs.difference(t); s-t`	all `s` not in `t`
`fs.symmetric_difference(t);s^t`	all either `s` or `t`
`fs.copy()`	shallow copy of `s`
`s.update(t); s|=t`	add elements of `t`
`s.intersection_update(t); s&=t`	keep only what is also in `t`
`s.difference_update(t); s-=t`	remove elements of `t`
`s.symmetric_differ...(t); s^=t`	keep only symm. difference
`s.add(x)`	add `x` to `fs`
`s.remove(x); fs.discard(x);`	remove `x` (/ with exception)
`s.pop();`	return and remove any elem.
`s.clear();`	remove all elements

1.5 Strings and Regular Expressions

`"bla"; 'hello "world"'`	string (of bytes)
`"""bla""", '''bla'''`	triple quotes for multiline
`\    \\    \0`	cont., backslash, null char
`\N{id} \uhhhh \Uhhhhhhhh`	unicode char
`\xhh \ooo`	hex, octal byte
`u"Ünic\u00F8de"; u"\xF8"`	unicode string (of characters)
`r"C:\new\text.dat"; ur"\\Ü"`	raw string (unicode)
`str(3.14); str(42)`	string conversion
`"%s-%s-%s" % (42,3.14,[1,2,3])`	string formatting
`'\t'.join(seq)`	join sequences with separator
`s.decode('utf-8')`	latin-1 string to unicode string
`u.encode('utf-8')`	unicode string to utf-8 string
`chr(i), unichr(i)`	char from code point
`str(x)`	string from number/object

Other String Methods:

search and replace: `find(s,b,e), rfind(s,b,e), index(s,b,e), rindex(s,b,e), count(s,b,e), endswith(s,b,e), startswith(s,b,e), replace(o,n,m)`

formatting: `capitalize, lower, upper, swapcase, title`

splitting: `partition(s), rpartition(s), split(s,m), rsplit(s,m), splitlines(ke)`

padding: `center(w,c), ljust(w,c), lstrip(cs), rjust(w,c), rstrip(cs), strip(cs), zfill(w), expandtabs(ts)`

checking: `isalnum, isalpha, isdigit, islower, isspace, istitle, isupper`

String Constants: `import string`
`digits, hexdigits, letters, lowercase, octdigits, printable, punctuation, uppercase, whitespace`

Regexes: `import re`

`r=re.compile(r'rx',re.ILMSUX)`	comile 'rx' as regex
`(?P<id>...)`	named group
`m=r.match(s,b,e)`	full match
`re.match(r'(?iLmsux)rx',s)`	direct regex usage
`m=r.search(s,b,e)`	partial match
`l=r.split(s,ms)`	split and return list
`l=r.findall(string)`	list of all matched groups
`s=r.sub(s,r,c)`	replace c counts of s with r
`(s,n)=r.subn(s,r,c)`	n is number of replacements
`s=re.escape(s)`	escape all non-alphanumerics
`m.start(g);m.span(g);m.end(g)`	group-match delimiters
`m.expand(s)`	replace \1 etc. with matches
`m.group(g); m.group("name")`	matched group no. g
`m.groups()`	list of groups
`m.groupdict()`	dict of named groups

2 Basic Syntax

`if expr: statements`	conditional
`elif expr: statements`	
`else: statements`	
`if a is b : ...`	object identity
`if a == 1`	value identity
`while expr: statements`	while loop
`else: statements`	run else on normal exit
`while True: ... if cond: break`	do... while equivalent
`for target in iter: statements`	for loop
`else: statements`	
`for key,value in d.items():...`	multiple identifiers
`break, continue`	end loop / jump to next
`print "hello world",`	print without newline
`[ expr for x in seq lc ]`	list comprehension
`  lc = for x in seq / if expr`	with lc-clauses
`pass`	empty statement
`def f(params): statements`	function definition
`def f(x, y=0): return x+y`	optional parameter
`def f(*a1, **a2): statements`	additional list of unnamed, dict of named paramters
`def f(): f.variable = 1 ...`	function attribute
`return expression`	return from function
`yield expression`	make function a generator
`f(1,1), f(2), f(y=3, x=4)`	function calls
`global v`	bind to global variable
`def make_adder_2(a):`	closure
`    def add(b): return a+b`	
`    return add`	
`lambda x: x+a`	lambda expression
`compile(string,filename,kind)`	compile string into code object
`eval(expr,globals,locals)`	evaluate expression

`exec code in gldict, lcdict`	compile and execute code
`execfile(file,globals,locals)`	execute file
`raw_input(prompt)`	input from stdin
`input(prompt)`	input and evaluate

3 Object Orientation and Modules

`import module as alias`	import module
`from module import name1,name2`	load attr. into own namespace
`from __future__ import *`	activate all new features
`reload module`	reinitialize module
`module.__all__`	exported attributes
`module.__name__`	module name / "__main__"
`module.__dict__`	module namespace
`__import__("name",glb,loc,fl)`	import module by name
`class name (superclass,...):`	class definition
`    data = value`	shared class data
`    def method(self,...): ...`	methods
`    def __init__(self, x):`	constructor
`        Super.__init__(self)`	call superclass constructor
`        self.member = x`	per-instance data
`    def __del__(self): ...`	destructor
`__str__, __len__, __cmp__,__`	some operator overloaders
`__iter__(self): return self`	use `next` method for iterator
`__call__`	call interceptor
`__dict__`	instance-attribute dictionary
`__getattr__(self, name),`	get an unknown attribute
`__setattr__(self, name, value)`	set any attribute
`callable(object)`	1 if callable, 0 otherwise
`delattr(object, "name")`	delete name-attr. from object
`del(object)`	unreference object/var
`dir(object)`	list of attr. assoc. with object
`getattr(object, "name", def)`	get name-attr. from object
`hasattr(object, "name")`	check if object has attr.
`hash(object)`	return hash for object
`id(object)`	unique integer (mem address)
`isinstance(object, classOrType)`	check for type
`issubclass(class1, class2)`	class2 subclass of class1?
`iter(object, sentinel)`	return iterator for object
`locals()`	dict of local vars of caller
`repr(object), str(object)`	return string-representation
`vars(object)`	return __dict__
`None`	the NULL object
`if __name__ == "__main__":`	make modul executable

4 Exception Handling

`try: ...`	Try-block
`except ExceptionName:`	catch exception
`except (Ex1, ...), data:`	multiple, with data
`    print data`	exception handling
`    raise`	pass up (re-raise) exception
`else: ...`	if no exception occurred
`finally: ...`	in any case
`assert expression`	debug assertion
`class MyExcept(Exception): ...`	define user exception
`raise MyExcept(data)`	raise user exception

5 System Interaction

`sys.path`	module search path
`sys.platform`	operating system
`sys.stdout, stdin, stderr`	standard input/output/error
`sys.argv[1:]`	command line parameters
`os.system(cmd)`	system call
`os.startfile(f)`	open file with assoc. program
`os.popen(cmd, r|w, bufsize)`	open pipe (file object)
`os.popen2(cmd, bufsize, b|t)`	(`stdin, stdout`) fileobjects
`os.popen3(cmd, bufsize, b|t)`	(`stdin, stdout,stderr`)
`os.environ['VAR']; os.putenv[]`	read/write environment vars
`glob.glob('*.txt')`	wildcard search

Filesystem Operations

os module: `access, chdir, chmod, chroot, getcwd, getenv, listdir, mkdir, remove, unlink, removedirs, rename, rmdir, pipe, ...`

shutil module: `copy, copy2, copyfile, copyfileobj, copymode, copystat, copytree, rmtree`

os.path module: `abspath, altsep, basename, commonprefix, curdir, defpath, dirname, exists, expanduser, expandvar, extsep, get[acm]time, getsize, isabs, isdir, isfile, islink, ismout, join, lexists, normcase, normpath, pardir, pathsep, realpath, samefile, sameopenfile, samestat, sep, split, splitdrive, splitext, stat, walk`

command line argument parsing:

```
restlist, opts = \
  getopt.getopt(sys.argv[1:],\
    "s:oh",\
    ["spam=", "other", "help"])
for o, a in opts:
    if o in ("-s", "--lol"): spam = a
    if o in ("-h", "--help"): show_help()
```

6 Input/Output

`f=codecs.open(if,"rb","utf-8")`	open file with encoding
`file = open(infilename, "wb")`	open file without encoding
`codecs.EncodedFile(...)`	wrap file into encoding
`r, w, a, r+`	read, write, append, random
`rb, wb, ab, r+b`	modes without eol conversion
`file.read(N)`	N bytes (entire file if no N)
`file.readline()`	the next linestring
`file.readlines()`	list of linestring
`file.write(string)`	write string to file
`file.writelines(list)`	write list of linestrings
`file.close()`	close file
`file.tell()`	current file position
`file.seek(offset, whence)`	jump to file position
`os.truncate(size)`	limit output to size
`os.tmpfile()`	open anon temporary file
`pickle.dump(x, file)`	make object persistent
`x = pickle.load(file)`	load object from file

7 Standard Library (almost complete)

String Services: `string, re, struct, difflib, StringIO, cStringIO, textwrap, codecs, unicodedata, stringprep, fpformat`

File/Directory Access: `os.path, fileinput, stat, statvfs, filecmp, tempfile, glob, fnmatch, linecache, shutil, dircache`

Generic OS services: `os, time, optparse, getopt, logging, getpass, curses, platform, errno, ctypes`

Optional OS services: `select, thread, threading, dummy_thread, dummy_threading, mmap, readline, rlcompleter`

Data Types: `datetime, calendar, collections, heapq, bisect, array, sets, sched, mutex, Queue, weakref, UserDict, UserList, UserString, types, new, copy, pprint, repr`

Numeric and Math Modules: `math, cmath, decimal, random, itertools, functools, operator`

Internet Data Handling: `email, mailcap, mailbox, mhlib, mimetools, mimetypes, MimeWriter, mimify, multifile, rfc822, base64, binhex, binascii, quopri, uu`

Structured Markup Processing Tools: `HTMLParser, sgmllib, htmllib, htmlentitydefs, xml.parsers.expat, xml.dom.*, xml.sax.*, xml.etree.ElementTree`

File Formats: `csv, ConfigParser, robotparser, netrc, xdrlib`

Crypto Services: `hashlib, hmac, md5, sha`

Compression: `zlib, gzip, bz2, zipfile, tarfile`

Persistence: `pickle, cPickle, copy_reg, shelve, marshal, anydbm, whichdb, dbm, gdbm, dbhash, bsddb, dumbdbm, sqlite3`

Unix specific: `posix, pwd, spwd, grp, crypt, dl, termios, tty, pty, fcntl, posixfile, resource, nis, syslog, commands`

IPC/Networking: `subprocess, socket, signal, popen2, asyncore, asynchat`

Internet: `webbrowser, cgi, scitb, wsgiref, urllib, httplib, ftplib, imaplib, nntplib, ...lib, smtpd, uuid, urlparse, SocketServer, ...Server,, cookielib, Cookie, xmlrpclib`

Multimedia: `audioop, imageop, aifc, sunau, wave, chunk, colorsys, rgbimg, imghdr, sndhdr, ossaudiodev`

Tk: `Tkinter, Tix, ScrolledText, turtle`

Internationalization: `gettext, locale`

Program Frameworks: `cmd, shlex`

Development: `pydoc, doctest, unittest, test`

Runtime: `sys, warnings, contextlib, atexit, traceback, qc, inspect, site, user, fpectl`

Custom Interpreters: `code, codeop`

Restricted Execution: `rexec, Bastion`

Importing: `imp, zipimport, pkgutil, modulefinder, runpy`

Language: `parser, symbol, token, keyword, tokenize, tabnanny, pyclbr, py_compile, compileall, dis, pickletools, distutils`

Windows: `msilib, msvcrt, _winreq, winsound`

Misc: `formatter`