Having a comprehensive cheat sheet at hand when starting your programming adventure or even while coding as an experienced developer makes you more confident in your skills and saves time.

python 3 beginner's cheat sheet

Mihai Cătălin Teodosiu @ epicpython.io

Python 3 Beginner's Cheat Sheet

Mihai Cătălin Teodosiu
Visit my website at www.EpicPython.io

Latest Release: September 2020

About the author

Mihai Cătălin Teodosiu is a Network Engineer (CCNP), QA Specialist (ISTQB) and Python Developer who decided to share his knowledge and skills with anyone looking to learn Python programming from scratch, in an easy-to-understand, learn-by-doing fashion, without the fancy wording and endless rambling and gibberish that most authors tend to include in their books and training courses.

Mihai's beginner-friendly teaching methods turned out to be very efficient for tens of thousands of students enrolled in his Python 2.x and 3.x video courses, published on various e-learning platforms.

From California to Fiji and from Norway to South Africa, Mihai helped programming rookies become proficient in Python, upgrade their skills and nail job interviews. Now, he's grateful for having the chance to help you, as well.

For more details and Mihai's courses and services, please go to https://epicpython.io/

Table of Contents

Python 3 - Basics

```
#Defining a variable
my_var = 10 #type integer
my_var = "Hello" #type string
my_var = True #type boolean

#User input
input("Please enter the string you want to be printed out: ")

#Saving the input to a variable
user_says = input("Please enter the string you want to be printed out: ")

#The input of the user is saved as a string by the input() function!
```

Python 3 - Strings

```
#Strings - indexing
a = "Cisco Switch"

a.index("i")

#Strings - character count
a = "Cisco Switch"

a.count("i")

#Strings - finding a character
a = "Cisco Switch"

a.find("sco")

#Strings - converting the case
a = "Cisco Switch"
```

```
a.lower() #lowercase

a.upper() #uppercase

#Strings - checking whether the string starts with a character
a = "Cisco Switch"

a.startswith("C")

#Strings - checking whether the string ends with a character
a = "Cisco Switch"

a.endswith("h")

#Strings - removing a character from the beginning and the end of a string
a = "   Cisco Switch   "

a.strip() #remove whitespaces

b = "$$$Cisco Switch$$$"

b.strip("$") #remove a certain character

#Strings - removing all occurences of a character from a string
a = "   Cisco Switch   "

a.replace(" ", "") #replace each space character with the absence of any character

#Strings - splitting a string by specifying a delimiter; the result is a list
a = "Cisco,Juniper,HP,Avaya,Nortel" #the delimiter is a comma

a.split(",")

#Strings - inserting a character in between every two characters of the string / joining the characters by using a delimiter
a = "Cisco Switch"
```

```
"_".join(a)

#Additional methods
#source: https://www.tutorialspoint.com/python3/python_strings.htm

capitalize()
#Capitalizes first letter of string.

lstrip()
#Removes all leading whitespace in string.

rstrip()
#Removes all trailing whitespace of string.

swapcase()
#Inverts case for all letters in string.

title()
#Returns "titlecased" version of string, that is, all words begin with uppercase and the rest are
lowercase.

isalnum()
#Returns true if string has at least 1 character and all characters are alphanumeric and false
otherwise.

isalpha()
#Returns true if string has at least 1 character and all characters are alphabetic and false
otherwise.

isdigit()
#Returns true if string contains only digits and false otherwise.

islower()
#Returns true if string has at least 1 cased character and all cased characters are in lowercase
and false otherwise.

isnumeric()
#Returns true if a unicode string contains only numeric characters and false otherwise.
```

```
isspace()
#Returns true if string contains only whitespace characters and false otherwise.

istitle()
#Returns true if string is properly "titlecased" and false otherwise.

isupper()
#Returns true if string has at least one cased character and all cased characters are in uppercase and false otherwise.
#source: https://www.tutorialspoint.com/python3/python_strings.htm

#Strings - concatenating two or more strings
a = "Cisco"
b = "2691"

a + b

#Strings - repetition / multiplying a string
a = "Cisco"
a * 3

#Strings - checking if a character is or is not part of a string
a = "Cisco"

"o" in a
"b" not in a

#Strings - formatting v1
"Cisco model: %s, %d WAN slots, IOS %f" % ("2600XM", 2, 12.4)
"Cisco model: %s, %d WAN slots, IOS %.f" % ("2600XM", 2, 12.4)
"Cisco model: %s, %d WAN slots, IOS %.1f" % ("2600XM", 2, 12.4)
"Cisco model: %s, %d WAN slots, IOS %.2f" % ("2600XM", 2, 12.4)

#Strings - formatting v2
"Cisco model: {}, {} WAN slots, IOS {}".format("2600XM", 2, 12.4)
"Cisco model: {0}, {1} WAN slots, IOS {2}".format("2600XM", 2, 12.4)
```

```
#Strings - formatting v3 (f-strings)
model = "2950M"
wan = 4
ios = "12.2"

f"Cisco model: {model}, {wan} WAN slots, IOS {ios}"

#Strings - slicing
string1 = "O E2 10.110.8.9 [160/5] via 10.119.254.6, 0:01:00, Ethernet2"

string1[5:15] #slice starting at index 5 up to, but NOT including, index 15; so index 14 represents the last element in the slice

string1[5:] #slice starting at index 5 up to the end of the string

string1[:10] #slice starting at the beginning of the string up to, but NOT including, index 10

string1[:] #returns the entire string

string1[-1] #returns the last character in the string

string1[-2] #returns the second to last character in the string

string1[-9:-1] #extracts a certain substring using negative indexes

string1[-5:] #returns the last 5 characters in the string

string1[:-5] #returns the string minus its last 5 characters

string1[::2] #adds a third element called step; skips every second character of the string

string1[::-1] #returns string1's elements in reverse order
```

Python 3 - Numbers and Booleans

```
#Numbers
num1 = 10
num2 = 2.5

type(num1) #checking the type of this variable; integer
type(num2) #checking the type of this variable; float

#Numbers - math operations
1 + 2 #addition

2 – 1 #subtraction

4 / 2 #division

4 * 2 #multiplication

4 ** 2 #raising to a power

5 % 2 #modulo (this means finding out the remainder after division of one number by another)

#Numbers - float division vs. integer division (special case)
3 / 2 #float division; result is 1 in Python 2 and 1.5 in Python 3

3 // 2 #integer division; result is 1 in Python 2 and Python 3

#Numbers - order of evaluation in math operations
#Highest priority: raising to a power; Medium priority: division, multiplication and modulo;
Low priority: addition and subtraction
100 - 5 ** 2 / 5 * 2 #1st: 5 ** 2, second: / then *, third - ; result is 90.0

#Numbers - conversion between numeric types
```

int(1.5) #result is 1

float(2) #result is 2.0

#Numbers - useful functions
abs(5) #the distance between the number in between parantheses and 0

abs(-5) #returns the same result as abs(5)

max(1, 2) #returns the largest number

min(1, 2) #returns the smallest number

pow(3, 2) #another way of raising to a power

Booleans - logical operations
(1 == 1) and (2 == 2) #result is True; AND means that both operands should be True in order to get the expression evaluated as True

(1 == 1) or (2 == 2) #result is True; when using OR, it is enough if only one expression is True, in order to have True as the final result

not(1 == 1) #result is False; using the NOT operator means denying an expression, in this case denying a True expression

not(1 == 2) #result is True; using the NOT operator means denying an expression, in this case denying a False expression

None, 0, 0.0, 0L, 0j, empty string, empty list, empty tuple, empty dictionary #these values always evaluate to False

bool(None) #returns False; function that evaluates values and expressions

bool(0) #returns False; function that evaluates values and expressions

bool(2) #returns True; function that evaluates values and expressions

bool("router") #returns True; function that evaluates values and expressions

Python 3 - Lists

```
#Lists
list1 = ["Cisco", "Juniper", "Avaya", 10, 10.5, -11]  #creating a list

len(list) #returns the number of elements in the list

list1[0] #returns "Cisco" which is the first element in the list (index 0)

list1[0] = "HP" #replacing the first element in the list with another value

#Lists - methods
list2 = [-11, 2, 12]

min(list2) #returns the smallest element (value) in the list

max(list2) #returns the largest element (value) in the list

list1 = ["Cisco", "Juniper", "Avaya", 10, 10.5, -11]

list1.append(100) #appending a new element to the list

del list1[4] #removing an element from the list by index

list1.pop(0) #removing an element from the list by index

list1.remove("HP") #removing an element from the list by value

list1.insert(2, "Nortel") #inserting an element at a particular index

list1.extend(list2) #appending a list to another list

list1.index(-11) #returns the index of element -11

list1.count(10) #returns the number of times element 10 is in the list
```

list2 = [9, 99, 999, 1, 25, 500]

list2.sort() #sorts the list elements in ascending order; modifies the list in place

list2.reverse() #sorts the list elements in descending order; modifies the list in place

sorted(list2) #sorts the elements of a list in ascending order and creates a new list at the same time

sorted(list2, reverse = True) #sorts the elements of a list in descending order and creates a new list at the same time

list1 + list2 #concatenating two lists

list1 * 3 #repetition of a list

#Lists - slicing (works the same as string slicing, but with list elements instead of string characters)
a_list[5:15] #slice starting at index 5 up to, but NOT including, index 15; so index 14 represents the last element in the slice

a_list[5:] #slice starting at index 5 up to the end of the list

a_list[:10] #slice starting at the beginning of the list up to, but NOT including, index 10

a_list[:] #returns the entire list

a_list[-1] #returns the last element in the list

a_list[-2] #returns the second to last element in the list

a_list[-9:-1] #extracts a certain sublist using negative indexes

a_list[-5:] #returns the last 5 elements in the list

a_list[:-5] #returns the list minus its last 5 elements

```
a_list[::2] #adds a third element called step; skips every second element of the list

a_list[::-1] #returns a_list's elements in reverse order
```

Python 3 - Sets and Frozensets

```
#Sets - unordered collections of unique elements
set1 = {"1.1.1.1", "2.2.2.2", "3.3.3.3", "4.4.4.4"} #creating a set

list1 = [11, 12, 13, 14, 15, 15, 15, 11]
string1 = "aaabcdeeefgg"

set1 = set(list1) #creating a set from a list; removing duplicate elements; returns {11, 12, 13, 14, 15}

set2 = set(string1) #creating a set from a string; removing duplicate characters; returns {'b', 'a', 'g', 'f', 'c', 'd', 'e'}; remember that sets are UNORDERED collections of elements

len(set1) #returns the number of elements in the set

11 in set1 #returns True; checking if a value is an element of a set

10 not in set 1 #returns True; checking if a value is an element of a set

set1.add(16) #adding an element to a set

set1.remove(16) #removing an element from a set

#Frozensets - immutable sets.
#The elements of a frozenset remain the same after creation.
fs1 = frozenset(list1) #defining a frozenset

fs1
frozenset({11, 12, 13, 14, 15}) #the result
```

```
type(fs1)
<class 'frozenset'> #the result

#proving that frozensets are indeed immutable
fs1.add(10)
AttributeError: 'frozenset' object has no attribute 'add'

fs1.remove(1)
AttributeError: 'frozenset' object has no attribute 'remove'

fs1.pop()
AttributeError: 'frozenset' object has no attribute 'pop'

fs1.clear()
AttributeError: 'frozenset' object has no attribute 'clear'

#Sets - methods
set1.intersection(set2) #returns the common elements of the two sets

set1.difference(set2) #returns the elements that set1 has and set2 doesn't

set1.union(set2) #unifying two sets; the result is also a set, so there are no duplicate elements; not to be confused with concatenation

set1.pop() #removes a random element from the set; set elements cannot be removed by index because sets are UNORDERED collections of elements, so there are no indexes to use

set1.clear() #clearing a set; the result is an empty set
```

Python 3 - Tuples

```
#Tuples - immutable lists (their contents cannot be changed by adding, removing or replacing elements)
my_tuple = () #creating an empty tuple

my_tuple = (9,) #creating a tuple with a single element; DO NOT forget the comma

my_tuple = (1, 2, 3, 4)

#Tuples - the same indexing & slicing rules apply as for lists
len(my_tuple) #returns the number of elements in the tuple

my_tuple[0] #returns the first element in the tuple (index 0)

my_tuple[-1] #returns the last element in the tuple (index -1)

my_tuple[0:2] #returns (1, 2)

my_tuple[:2] #returns (1, 2)

my_tuple[1:] #returns (2, 3, 4)

my_tuple[:] #returns (1, 2, 3, 4)

my_tuple[:-2] #returns (1, 2)

my_tuple[-2:] #returns (3, 4)

my_tuple[::-1] #returns (4, 3, 2, 1)

my_tuple[::2] #returns (1, 3)

#Tuples - tuple assignment / packing and unpacking
tuple1 = ("Cisco", "2600", "12.4")
```

(vendor, model, ios) = tuple1 #vendor will be mapped to "Cisco" and so are the rest of the elements with their corresponding values; both tuples should have the same number of elements

(a, b, c) = (1, 2, 3) #assigning values in a tuple to variables in another tuple

min(tuple1) #returns "12.4"

max(tuple1) #returns "Cisco"

tuple1 + (5, 6, 7) #tuple concatenation

tuple1 * 20 #tuple multiplication

"2600" in tuple1 #returns True

784 not in tuple1 #returns True

del tuple1 #deleting a tuple

Python 3 - Ranges

#Ranges - unlike in Python 2, where the range() function returned a list, in Python 3 it returns an iterator; cannot be sliced
r = range(10) #defining a range

r
range(0, 10) #the result

type(r)
<class 'range'> #the result

list(r) #converting a range to a list
[0, 1, 2, 3, 4, 5, 6, 7, 8, 9] #the result

list(r)[2:5] #slicing a range by using the list() function first
[2, 3, 4] #the result

Python 3 - Dictionaries. Conversions between data types

```
#Dictionaries - a dictionary is an unordered set of key-value pairs
dict1 = {} #creating an empty dictionary

dict1 = {"Vendor": "Cisco", "Model": "2600", "IOS": "12.4", "Ports": "4"}

dict1["IOS"] #returns "12.4"; extracting a value for a specified key

dict1["IOS"] = "12.3" #modifies an existing key-value pair

dict1["RAM"] = "128" #adds a new key-value pair to the dictionary

del dict1["Ports"] #deleting a key-value pair from the dictionary

len(dict1) #returns the number of key-value pairs in the dictionary

"IOS" in dict1 #verifies if "IOS" is a key in the dictionary

"IOS2" not in dict1 #verifies if "IOS2" is not a key in the dictionary

#Dictionaries - methods
dict1.keys() #returns a list having the keys in the dictionary as elements

dict1.values() #returns a list having the values in the dictionary as elements

dict1.items() #returns a list of tuples, each tuple containing the key and value of each dictionary
pair

#Conversions between data types
str() #converting to a string

int() #converting to an integer

float() #converting to a float

list() #converting to a list
```

```
tuple() #converting to a tuple

set() #converting to a set

bin() #converting to a binary representation

hex() #converting to a hexadecimal representation

int(variable, 2) #converting from binary back to decimal

int(variable, 16) #converting from hexadecimal back to decimal
```

Python 3 - Conditionals

```
#If / Elif / Else conditionals - executing code based on one or more conditions being evaluated as True or False; the "elif" and "else" clauses are optional
x = 5

if x > 5: #if the "x > 5" expression is evaluated as True, the code indented under the "if" clause gets executed, otherwise the execution jumps to the "elif" clause...
    print("x is greater than 5")
elif x == 5: #...if the "x == 5" expression is evaluated as True, the code indented under the "elif" clause gets executed, otherwise the execution jumps to the "else" clause
    print("x IS 5")
else: #this covers all situations not covered by the "if" and "elif" clauses; the "else" clause, if present, is always the last clause in the code block
    print("x is NOT greater than 5" )

#result of the above "if" block
x IS 5
```

Python 3 - For and While Loops

```
#For / For Else loops - executes a block of code a number of times, depending on the sequence it iterates on; the "else" clause is optional
vendors = ["Cisco", "HP", "Nortel", "Avaya", "Juniper"]

for element in vendors: #interating over a sequence and executing the code indented under the "for" clause for each element in the sequence
    print(element)
else: #the indented code below "else" will be executed when "for" has finished looping over the entire list
    print("The end of the list has been reached")

#result of the above "for" block
Cisco
HP
Nortel
Avaya
Juniper
The end of the list has been reached

#While / While Else loops - a while loop executes as long as an user-specified condition is evaluated as True; the "else" clause is optional
x = 1

while x <= 10:
    print(x)
    x += 1
else:
    print("Out of the while loop. x is now greater than 10")

#result of the above "while" block
1 2 3 4 5 6 7 8 9 10
Out of the while loop. x is now greater than 10
```

Python 3 - If / For / While Nesting

```
#If / For / While Nesting
x = "Cisco"

if "i" in x:
    if len(x) > 3: #if nesting
        print(x, len(x))

Cisco 5 #result of the above block

list1 = [4, 5, 6]
list2 = [10, 20, 30]
for i in list1:
    for j in list2: #for nesting
        print(i*j)

40 80 120 50 100 150 60 120 180 #result of the above block

x = 1
while x <= 10:
    z = 5
    x += 1
    while z <= 10:  #while nesting
        print(z)
        z += 1

5 6 7 8 9 10 5 6 7 8 9 10 5 6 7 8 9 10 5 6 7 8 9 10 5 6 7 8 9 10 5 6 7 8 9 10 5 6 7 8 9 10 5
6 7 8 9 10 5 6 7 8 9 10 5 6 7 8 9 10   #result of the above block

for number in range(10):
    if 5 <= number <= 9: #mixed nesting
        print(number)

5 6 7 8 9 #result of the above block
```

Python 3 - Break / Continue / Pass

```
#Break, Continue, Pass
list1 = [4, 5, 6]
list2 = [10, 20, 30]

for i in list1:
    for j in list2:
        if j == 20:
            break #stops the execution here, ignores the print statement below and completely quits THIS "for" loop; however, it doesn't quit the outer "for" loop, too!
        print(i * j)
    print("Outside the nested loop")

#result of the above block
40
Outside the nested loop
50
Outside the nested loop
60
Outside the nested loop

list1 = [4, 5, 6]
list2 = [10, 20, 30]

for i in list1:
    for j in list2:
        if j == 20:
            continue #ignores the rest of the code below for the current iteration, then goes up to the top of the loop (inner "for") and starts the next iteration
        print(i * j)
    print("Outside the nested loop")

#result of the above block
40
120
```

```
Outside the nested loop
50
150
Outside the nested loop
60
180
Outside the nested loop
```

```
for i in range(10):
    pass #pass is the equivalent of "do nothing"; it is actually a placeholder for when you just want to write a piece of code that you will treat later
```

Python 3 - Try / Except / Else / Finally

```
#Try / Except / Else / Finally - handling an exception when it occurs and telling Python to keep executing the rest of the lines of code in the program
try:
    print(4/0) #in the "try" clause you insert the code that you think might generate an exception at some point
except ZeroDivisionError:
    print("Division Error!") #specifying what exception types Python should expect as a consequence of running the code inside the "try" block and how to handle them
else:
    print("No exceptions raised by the try block!") #executed if the code inside the "try" block raises NO exceptions
finally:
    print("I don't care if an exception was raised or not!") #executed whether the code inside the "try" block raises an exception or not

#result of the above block
Division Error!
I don't care if an exception was raised or not!
```

Python 3 - Functions

```
#Functions - Basics
def my_first_function(x, y): #defining a function that takes two parameters
    sum = x + y
    return sum #this statement is used to exit a function and return something when the function is called

my_first_function(1, 2) #calling a function and passing two POSITIONAL arguments, the values of 1 and 2; result is 3

my_first_function(x = 1, y = 2) #calling a function and passing two KEYWORD arguments, the values of 1 and 2; result is 3

my_first_function(1, y = 2) #calling a function and passing mixed types of arguments, the values of 1 and 2; result is 3; rule: positional arguments always before keyword arguments!

def my_first_function(x, y, z = 3): #specifying a default parameter value in a function definition

def my_first_function(x, *args) #specifying a variable number of positional parameters in a function definition; args is a tuple

def my_first_function(x, **kwargs) #specifying a variable number of keyword parameters in a function definition; args is a tuple

global my_var #"importing" a variable in the global namespace to the local namespace of a function
```

Python 3 - Modules

```
#Modules and importing - Basics
import sys #importing the sys module; the import statements should be placed before any other code in your application

from math import pi #importing only a variable (pi) from the math module

from math import sin #importing only a function (sin()) from the math module; there's no need to add the parantheses of the function when importing it

from math import * #importing all the names (variables and functions) from the math module

#Installing a non-default Python 3 module in Windows is done from the command line (e.g. the openpyxl module)

C:\WINDOWS\system32> pip install openpyx

#Installing a non-default Python 3 module in macOS is done from the terminal (e.g. the openpyxl module)

mihais-MacBook-Pro:~ mihai$ pip3 install openpyx
```

Python 3 - File Operations

```
#Files - opening and reading a file
myfile = open("routers.txt", "r") #"r" is the file access mode for reading and it is the default mode when opening a file

myfile.mode #checking the mode in which a file has been opened

myfile.read() #method that returns the entire content of a file in the form of a string

myfile.read(5) #returning only the first 5 characters (bytes) in the file
myfile.seek(0) #moving the cursor at the beginning of the file

myfile.tell() #checking the current position of the cursor inside the file

myfile.readline() #returns the file content one line a ta time, each time you use the method

myfile.readlines() #returns a list where each element is a line in the file

#Files - writing and appending to a file
newfile = open("newfile.txt", "w") #opens/creates a new file for writing; the "w" method also
creates the file for writing if the file doesn't exist and overrides the file if the file already exists;
remember to close the file after writing to it to save the changes!

newfile.writelines(["Cisco", "Juniper", "HP", "\n"]) #this method takes a sequence of strings
as an argument and writes those strings to the file

newfile = open("newfile.txt", "a") #opening a file for appending

newfile = open("newfile.txt", "w+") #opens a file for both writing and reading at the same time

newfile = open("newfile.txt", "x") #opens for exclusive creation, failing if the file already exists

#Files - closing a file
newfile.closed #checking if a file is closed

newfile.close() #closing a file

with open("python.txt", "w") as f: #using the with-as solution, the files gets closed
automatically, without needing the close() method
    f.write("Hello Python!\n")

#Truncating files - the file should be open for reading AND writing, not just reading!
f = open("D:\\test.txt", "r+")
f.truncate() #this deletes all the content inside the file

#Truncating files - the file should be open for reading AND writing, not just reading!
f = open("D:\\test.txt", "r+")
f.truncate(10) #this will keep the first 10 characters in the file and delete the rest
```

Python 3 - Regular Expressions

#Regular Expressions - the "re.match" and "re.search" methods
a = re.match(pattern, string, optional flags) #general match syntax; "a" is called a match object if the pattern is found in the string, otherwise "a" will be None

mystr = "You can learn any programming language, whether it is Python2, Python3, Perl, Java, javascript or PHP."

import re #importing the regular expressions module

a = re.match("You", mystr) #checking if the characters "You" are indeed at the beginning of the string

a.group() #result is 'You'; Python returns the match it found in the string according to the pattern we provided

a = re.match("you", mystr, re.I) #re.I is a flag that ignores the case of the matched characters

a = re.search(pattern, string, optional flags) #general search syntax; searching for a pattern throughout the entire string; will return a match object if the pattern is found and None if it's not found

arp = "22.22.22.1   0   b4:a9:5a:ff:c8:45 VLAN#222   L"

a = re.search(r"(.+?) +(\d) +(.+?)\s{2,}(\w)*", arp) #result is '22.22.22.1'; 'r' means the pattern should be treated like a raw string; any pair of parentheses indicates the start and the end of a group; if a match is found for the pattern inside the parentheses, then the contents of that group can be extracted with the group() method applied to the match object; in regex syntax, a dot represents any character, except a new line character; the plus sign means that the previous expression, which in our case is just a dot, may repeat one or more times; the question mark matching as few characters as possible

a.groups() #returns all matches found in a given string, in the form of a tuple, where each match is an element of that tuple
('22.22.22.1', '0', 'b4:a9:5a:ff:c8:45 VLAN#222', 'L')

```
#Regular Expressions - the "re.findall" and "re.sub" methods
a = re.findall(r"\d\d\.\d{2}\.[0-9][0-9]\.[0-9]{1,3}", arp) #returns a list where each element is a pattern that was matched inside the target string
['22.22.22.1'] #result of the above operation - a list with only one element, the IP address matched by the regex

b = re.sub(r"\d", "7", arp) #replaces all occurrences of the specified pattern in the target string with a string you enter as an argument
'77.77.77.7      7          b7:a7:7a:ff:c7:77 VLAN#777             L    77.77.77.77' #result of the above operation
```

Python 3 - Basics of OOP. Classes and Objects

```
#Classes and objects
class MyRouter(object): #creating a class which inherts from the default "object" class
   def __init__(self, routername, model, serialno, ios): #class constructor; initializing some variables and the method is called whenever you create a new instance of the class
       self.routername = routername #"self" is a reference to the current instance of the class
       self.model = model
       self.serialno = serialno
       self.ios = ios

   def print_router(self, manuf_date):
       print("The router name is: ", self.routername)
       print("The router model is: ", self.model)
       print("The serial number of: ", self.serialno)
       print("The IOS version is: ", self.ios)
       print("The model and date combined: ", self.model + manuf_date)

router1 = MyRouter('R1', '2600', '123456', '12.4') #creating an object by simply calling the class name and entering the arguments required by the __init__ method in between parentheses

router1.model #accessing the object's attributes; result is '2600'
```

```
router1.print_router("20150101") #accessing a function (actually called method) from within the class
The router name is:  R1
The router model is:  2600
The serial number of:  123456
The IOS version is:  12.4
The model and date combined:  260020150101

getattr(router1, "ios") #getting the value of an attribute

setattr(router1, "ios", "12.1") #setting the value of an attribute

hasattr(router1, "ios") #checking if an object attribute exists

delattr(router1, "ios") #deleting an attribute

isinstance(router1, MyRouter) #verifying if an object is an instance of a particular class

class MyNewRouter(MyRouter): #creating a new class (child) inheriting from the MyRouter parent class
    ...

issubclass(MyNewRouter, MyRouter) #returns True or False; checking if a class is the child of another class
```

Python 3 - List comprehensions

```
#List / Set / Dictionary comprehensions
#Instead of...
list1 = []
for i in range(10):
    j = i ** 2
    list1.append(j)

#...we can use a list comprehension
```

```
list2 = [x ** 2 for x in range(10)]

list3 = [x ** 2 for x in range(10) if x > 5] #with a conditional statament

set1 = {x ** 2 for x in range(10)} #set comprehension

dict1 = {x: x * 2 for x in range(10)} #dictionary comprehension
```

Python 3 - Lambda functions

```
#Lambda functions - anonymous functions
lambda arg1, arg2, ..., arg n: an expression using the arguments #general syntax

a = lambda x, y: x * y #defining a lambda function

a(20, 10) #result is 200; calling the lambda function

#Instead of...
def myfunc(list):
    prod_list = []
    for x in range(10):
        for y in range(5):
            product = x * y
            prod_list.append(product)
    return prod_list + list

#...we can use a lambda function, a list comprehension and concatenation on a single line of code
b = lambda list: [x * y for x in range(10) for y in range(5)] + list
```

Python 3 - map() and filter()

```
#Map and Filter

#map() - takes a function and a sequence as arguments and applies the function to all the elements of the sequence, returning a list as the result
def product10(a):
    return a * 10

list1 = range(10)

map(product10, list1) #result is [0, 10, 20, 30, 40, 50, 60, 70, 80, 90]; applying the product10() function to each element of list1
#or...
map((lambda a: a * 10), list1) #result is [0, 10, 20, 30, 40, 50, 60, 70, 80, 90] as well

#filter() - takes a function and a sequence as arguments and extracts all the elements in the list for which the function returns True
filter(lambda a: a > 5, list1) #result is [6, 7, 8, 9]
```

Python 3 - Basics of Iterators and Generators

```
#Iterators - an object which allows a programmer to traverse through all the elements of a collection
my_list = [1, 2, 3, 4, 5, 6, 7]

my_iter = iter(my_list) #iter() returns an interator object

next(my_iter) #in Python 2 and 3, it returns the elements of a sequence one by one; raises StopIteration when the sequence is exhausted

#Generators - special routines that can be used to control the iteration behavior of a loop; defined using the "def" keyword;
def my_gen(x, y): #creating a generator function
    for i in range(x):
        print("i is %d" % i)
        print("y is %d" % y)
        yield i * y   #yields the values one at a time; traversing a sequence up to a certain point, getting the result and suspending the execution

my_object = my_gen(10, 5) #creating a generator object

next(my_object) #manually yield the next element returned by the my_gen() function; raises StopIteration when the sequence is exhausted

gen_exp = (x for x in range(5)) #creating a generator expression; similar to list comprehensions, but using parentheses instead of square brackets

next(gen_exp) #extracting each value in the list generated by range(5), one value at a time; raises StopIteration when the sequence is exhausted
```

Python 3 - itertools

```
#Itertools - built-in Python module for working with iterable data sets
import itertools

list1 = [1, 2, 3, 'a', 'b', 'c']
list2 = [101, 102, 103, 'X', 'Y']

#chain() - takes several sequences and chains them together
chain(list1, list2)

list(chain(list1, list2)) #result is [1, 2, 3, 'a', 'b', 'c', 101, 102, 103, 'X', 'Y']

#count() - returns an iterator that generates consecutive integers until you stop it, otherwise it will go on forever
for i in count(10, 2.5):
    if i <= 50:
        print(i)
    else:
        break   #result is printing the numbers between 10 and 50 inclusively, with a step of 2.5
```

```
#cycle() - returns an iterator that simply repeats the value given as argument infinitely; you have to find a way to break out of the infinite loop
a = range(11, 16)

for i in cycle(a):
    print(i) #use Ctrl+C to break out of the infinite loop

#filterfalse() - returns the elements for which the function you give as argument returns False
list(filterfalse(lambda x: x < 5, [1, 2, 3, 4, 5, 6, 7])) #in Python 2 the result is [5, 6, 7]; in Python 3 there is no ifilter() like in Python 2, just filter() and filterfalse()

#islice() - performs slicing; we can specify a starting point of the slice, an end point and a step
list(islice(range(10), 2, 9, 2)) #result is [2, 4, 6, 8]
```

Python 3 - Basics of Decorators

```
#Decorators - functions that take another function as a parameter and extend its functionality and behavior without modifying it
def my_decorator(target_function):
    def function_wrapper():
        return "Python is the " + target_function() + " programming language!"
    return function_wrapper

@my_decorator
def target_function():
    return "coolest"

target_function() #returns 'Python is the coolest programming language!'
```

Note: The official documentation of Python 3 is available here