Functions in Python

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What is a function?

Definition

A function is something you can call (possibly with some parameters, the things you put in the parentheses), which performs an action and returns a value.

Example

```
def hello(name, greeting):
    return greeting + ", " + name"
print hello('Markus', 'privet!')
```

Define first, then call!

In python, a function must be defined before you can call it. That is, define it on line 10, call it on line 15.

Why Use Functions?

Functions are extremely useful because:

- They make code reusable
- They make a program more structured & more readable, especially when it gets longer
- They make it is easier to work with several programmers

Parameters (Arguments)

Definition

Parameters (also known as arguments) are inputs to functions.

Example

When you use the `min()` function, you pass the function a list as a parameter

Local Scope

Definition

Variables and parameters in functions have local scope.

```
def change_name(name):
    name = 'Iggy Pop'

name = 'Meatloaf'
change_name(name)
print name
```

```
def again():
    mypi = 3.11
print mypi
```

Local Scope (2)

Definition

Mutable data structures change in functions.

```
def change(lis):
    lis.append('the end')

mylist = ['my', 'home', 'is', 'my', 'castle']
change(mylist)
print mylist
```

3 Types of Parameters

positional Positional parameters must be entered in the correct order

hello(name, greeting)

keyword Keyword parameters can be entered in any order

hello(greeting='Servus', name='Matthias')

collected Parameters can also be collected by a function, allowing the user to input any number of parameters to the function

```
def hello3(*collectedParams):
    return collectedParams
print hello3('foo', 'bar', 0)
```

Parameter Types

Definition

Any kind of variable can be passed to a function (string, integer, float, list, dict, tuple, object). Your function must use these as the right type though.

Example

```
def sortStudents(students):
    return sorted(students)

theStudents='John and Mary'
print sortStudents(theStudents)
theStudents=['John', 'Mary']
print sortStudents(theStudents)
```

Parameter Types (2)

Comment your code!

You must know/remember which types work for a function, so it makes sense to add comments that specify the types of the parameters and of the return value.

Example

```
# function sortStudents sorts the input and returns it
# input: students – list or string
# output: list or string
def sortStudents(students):
    return sorted(students)
```

Return Values

Definition

Parameters are inputs to functions. Return values are outputs.

Multiple return values

To return more than one value, put them in a tuple

```
def hello():
    x=1
    y=2
    return (x,y)
foo=hello()
one,two=hello()
```

Tip on Printing

Avoid the following

Don't print out stuff in functions (unless debugging)

```
def hello():
    print "hello, world"
```

Instead, do the following

Do return stuff in functions and print later

```
def hello():
    return "hello, world"
print hello()
```