

# A Short and Incomplete Introduction to Python

## Part 2: Functions

**Sigve Haug** <sigve.haug@math.unibe.ch>,  
Alexander Kashev <alexander.kashev@math.unibe.ch>  
Science IT Support (SciTS), University of Bern

Based on a course by Riccardo Murri / Sergio Maffioletti  
S3IT: Services and Support for Science IT, UZH

# Functions

# Functions, I

Functions are called by postfixing the function name with a parenthesized argument list.

```
>>> int("42")
42
>>> int(4.2)
4
>>> float(42)
42.0
>>> str(42)
'42'
>>> str()
''
```

## Functions, II

Some functions can take a variable number of arguments. For instance:

`sum( $x_0, \dots, x_n$ )` Return  $x_0 + \dots + x_n$ .

`max( $x_0, \dots, x_n$ )` Return the maximum of  $\{x_0, \dots, x_n\}$

`min( $x_0, \dots, x_n$ )` Return the minimum of  $\{x_0, \dots, x_n\}$

Examples:

**In [1]:** `min(1, 2, 3)`

**Out[1]:** 1

**In [2]:** `max(1, 2)`

**Out[2]:** 2

# The most important function of all

`help(fn)` Display help on the function named `fn`

**Exercise 2.A:** What happens if you type these at the prompt?

- ▶ `help(abs)`
- ▶ `help(help)`

# How to define new functions

The **def** statement starts a function definition.

```
def greet(name):  
    """  
    A friendly function.  
    """  
    print ("Hello, " + name + "!")  
  
# the customary greeting  
greet("world")
```

## Indentation is significant

**in Python:** it is used to delimit blocks of code, like '{' and '}' in Java and C.

```
def greet(name):
```

```
    """
```

```
    A friendly function.
```

```
    """
```

```
    print ("Hello, " + name + "!")
```

```
# the customary greeting
```

```
greet("world")
```

(This is a comment. It is ignored by Python, just like blank lines.)

```
def greet(name):  
    """  
    A friendly function.  
    """  
    print ("Hello, " + name + "!")  
  
# the customary greeting  
greet("world")
```



This calls the function  
just defined.

```
def greet(name):  
    """  
    A friendly function.  
    """  
    print ("Hello, " + name + "!")  
  
# the customary greeting  
greet("world")
```

What is this? The answer  
in the next exercise!

```
def greet(name):  
    """  
    A friendly function.  
    """  
    print ("Hello, " + name + "!")  
  
# the customary greeting  
greet("world")
```

**Exercise 2.B:** Type and run the code on the previous page at the interactive prompt. (Pay attention to indentation!)

What's the result of evaluating the function  
`greet("world")`?

What does `help(greet)` output?

# Default values

Function arguments can have default values.

```
>>> def hello(name='world'):  
...     print ("Hello, " + name)  
...  
>>> hello()  
'Hello, world'
```

## Named arguments

Python allows calling a function with named arguments:

```
hello(name="Alice")
```

When passing arguments by name, they can be passed in any order:

```
>>> from fractions import Fraction
>>> Fraction(numerator=1, denominator=2)
Fraction(1, 2)
>>> Fraction(denominator=2, numerator=1)
Fraction(1, 2)
```

## The 'return' statement

```
def double(x):  
    return x+x
```

```
double(3) == 6
```

```
def double(x):  
    return x+x  
    # the following line  
    # is never exec'd  
    print('Hello')
```

The result of a function evaluation is set by the *return* statement.

If no `return` is present, the function returns the special value `None`.

After executing `return` the control flow leaves the function.

## Basic control flow

## Conditionals

Conditional execution uses the `if` statement:

```
if expr:  
    # indented block  
elif other-expr:  
    # indented block  
else:  
    # executed if none of the above matched
```

The `elif` can be repeated, with different conditions, or left out entirely.

Also the `else` clause is optional.

**Q:** *Where's the 'end if'?*



## Conditionals

Conditional execution uses the `if` statement:

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if expr:  
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    # executed if none of the above matched
```

The `elif` can be repeated, with different conditions, or left out entirely.

Also the `else` clause is optional.

**Q:** *Where's the 'end if'?*

*There's no 'end if': indentation delimits blocks!*

## while-Loops

Conditional looping uses the `while` statement:

```
while expr:  
    # indented block
```

To break out of a `while` loop, use the `break` statement.

Use the `continue` statement anywhere in the indented block to jump back to the `while` statement.

**Exercise 2.C:** Modify the `greet()` function to print “Welcome back!” if the argument `name` is the string `'Python'`.

# Modules

# Modules, I

The `import` statement reads a `.py` file, executes it, and makes its contents available to the current program.

```
>>> import hello
Hello, world!
```

**Modules are only read once**, no matter how many times an `import` statement is issued.

```
>>> import hello
Hello, world!
>>> import hello
>>> import hello
```

## Modules, II

Modules are *namespaces*: functions and variables defined in a module must be prefixed with the module name when used in other modules:

```
>>> hello.greet("Python")  
Hello, Python!
```

To import definitions into the current namespace, use the 'from *x* import *y*' form:

```
>>> from hello import greet  
>>> greet("Python")  
Hello, Python!
```