HKU

ECTTP: Functions

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Course Overview

- Week One: Variables
- Week Two: Operators
- Week Three : Conditions
- Week Four: Loops
- **Week Five: Functions ←**
- Week Six: Tuples
- Week Seven: **First Test!**
- Week Eight: Lists

- Week Nine: Classes and Objects
- Week Ten: Classes and Objects
- Week Eleven: Classes and Objects
- Week Twelve: **Second Test!**

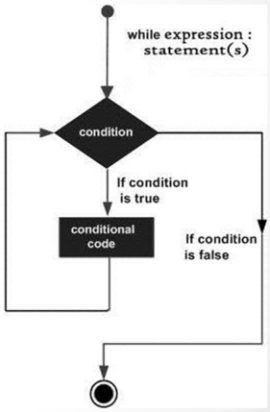
Our Super Powers so far…

- Variables! (Int, String, Boolean and Float)
- Mathematical Operators (+,*,-,/)
- Boolean Operators (and or not, >, <, ==, >=, <=, !=)
- If- statements!
- Modulo %
- Random(x, y)
- For-loops
- While-loops

While-loop

- While some condition is true, execute the code

```
x = 0
while x < 5 :
        x = x + 1
        print("I am looping!")
print("Aaaaand we'r e done")
```



For-loop

The for-loop let's the code run within a range, in this way the code is executed a limited amount of times

```
for i in range ( 3, 6 ):
        print ("I am printed 3 times")
```

i gets the value 3
then prints
i gets the value 4
then prints
i gets the value 5
then prints
then the for-loop exits

Function

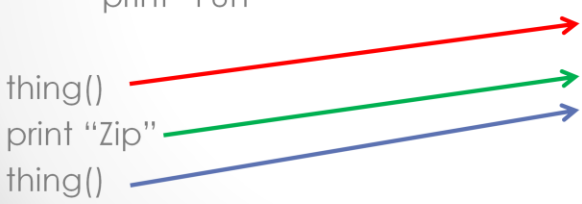
A function stores code which can be reused.

```
def thing():
        print "Hello"
        print "Fun"

thing()
print "Zip"
thing()
```

Output:

```
Hello
Fun
Zip
Hello
Fun
```



Python Functions

- There are two kinds of functions in Python
  - **Built-in** functions that are provided as part of Python:
    - raw_input(), type(), float(), int(), print()...
  - Functions that we **define ourselves** and then use

- We treat the built-in functions and our own function names as **reserved words** (don't use them as variable names)

Function Definition

- In Python a function is a piece of reusable code that can take **argument(s)** as **input**, does some computation and then **returns** a result or results
- We define a **function** using the **def** word
- We call/invoke the function by using the function name, parenthesis and arguments in an expression

Defining a function

```
def addTwoValues( x , y ):
        return x + y
```

- 'def' shows that we are defining a new function
- "addTwoValues" is the name of our function
- x and y are the parameters for this function
- The "return" keyword returns the value to the original place from where the function was called, if the function does not return a value, the return keyword can be omitted

Defining a function

```
def addTwoValues( x , y ):
        return x + y
```

- The body of the function is **indented** in Python
- The definition of the function does **not execute** the body of the function
- A **function call** (or invoke) executes the body of the function
- Do not forget the colon at the end ':'

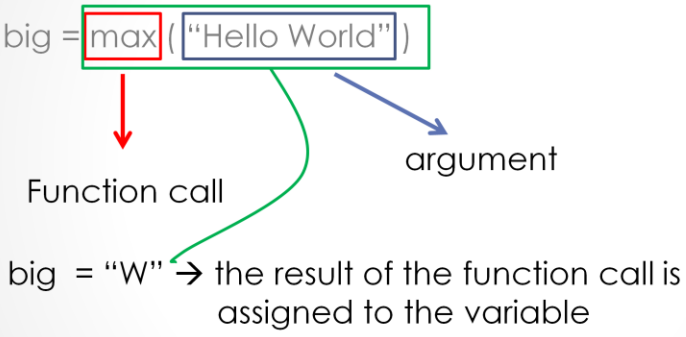
Example of a function call:

addTwoValues (3, 6) >>> this will return the value 9

Arguments

- An **argument** is a value we pass into the function as its **input** when we call the function
- We use **arguments** so we can direct the function to do **different kinds of work** when we call it at different times
- We put the arguments in **parenthesis** after the name of the function

Using a Function



big = "W" → the result of the function call is assigned to the variable

Parameters

- A **parameter** is a variable which we use in the function **definition** that is a "handle"that allows the code in the function to access the arguments for a particular function invocation.

```
def greet( lang ):
        if lang == 'es':
                print 'Hola'
        elif lang == 'fr':
                print 'Bonjour'
        else:
                print 'Hello'
```

greet('en') → Hello
greet('es') → Hola
greet('fr') → Bonjour

Multiple Parameters

```
def addTwo( a, b):
        added = a + b
        return added
x = addTwo ( 3, 5)
print x → 8
```

- We can define more than one parameter in the function definition
- We simply add more arguments when we call the function
- We **match** the **number** and **order** of arguments and parameters

Return Values

- Often a function will take its arguments, do some computation and return a value to be used as the value of the function call in the calling expression. The **return** keyword is used for this.

```
def greet():
        return "Hello"

print ( greet()+ "Glenn") → Hello Glenn
print ( greet()+ "Sally" )  →  Hello Sally
```

Return Value

- A "fruitful" function is one that **produces** a result (or **returns** a value)
- The **return** statement ends the function execution and **"sends back"** the result of the function

Void Functions

- When a function does not return a value, we call it "void"

- Functions that return values are "fruitful"functions
- Void functions are "not fruitful"

When to use functions

- **Organize** your code into "paragraphs" - capture a complete thought and "name it"
- **Don't repeat yourself** - make it work once and then reuse it as a function
- If something gets too long or **complex**, break up logical chunks and put those chunks in functions
- Make a library of **common code** that you do over and over - perhaps share this with your friends...

Exercise

- Rewrite your pay computation with time-and-a-half for overtime (you work 40 hours a week, the rest is overtime) and create a function called **computepay** which takes two parameters (hours and rate).
- Enter Hours: 45
- Enter Rate: 10
- Pay: 475.0
- Result: 40 * 10 + 5 * 15 = 475

Solution

```
def computepay ( hours, rate )
        overtime = 0
        if hours > 40:
                overtime = hours – 40
        return (hours – overtime) * rate + 1.5 *rate *overtime
```

Test your function:

computepay (0, 15) → 0

computepay (45 , 10) → 475

computepay (30 , 20) → 600

Fifth lab is online

https://github.com/vmuijrers/ECTTP/blob/master/Labs/Lab_5.md

#For examples/tutorials and references!
py.processing.org

#For more practise with python!
codecademy.com

#Now let's practise some more with codingbat:
http://codingbat.com/python