

# **Effective Programming Practices for Economists**

## **Basic Python**

### **Principles for Good Functions**

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- Why functions are important!
- Guidelines for self-contained functions
  - Pass all variables you want to use inside
  - Do not modify mutable arguments

# Why functions are important

- Help to re-use code and avoid duplication
- Help to structure code and reduce cognitive load
- Make individual code snippets testable
- Help to make your projects more reproducible
- Unlock the power of functional programming concepts
- Are also the basis for good object oriented code

# Pass all variables you want to use inside

```
# bad example
>>> global_msg = "Hello {}!"

>>> def greet_with_global(name):
...     print(global_msg.format(name))

>>> greet_with_global("Guido")
Hello Guido!
```

- Inside a function you have access to variables in the enclosing scope
- This is dangerous because the behaviour of the function now depends on global variables
- Do not use this in your code!

# Pass all variables you want to use inside

```
# solution 1: define inside function
```

```
>>> def greet(name):  
...     msg = "Hello {}!"  
...     print(msg.format(name))  
>>> greet("Guido")  
Hello Guido!
```

```
# solution 2: pass as argument
```

```
>>> def greet_explicit(name, msg):  
...     print(msg.format(name))  
  
>>> greet_explicit("Guido", "Hello {}!")  
Hello Guido!
```

- Inside a function you have access to variables in the enclosing scope
- This is dangerous because the behaviour of the function now depends on global variables
- Do not use this in your code!

# Do not modify mutable arguments

```
>>> def append_4(some_list):  
...     some_list.append(4)  
...     return some_list
```

```
>>> a = [1, 2, 3]  
>>> append_4(a)  
[1, 2, 3, 4]
```

```
>>> a  
[1, 2, 3, 4]
```

# better solution

```
>>> def append_4(some_list)  
...     out = some_list.copy()  
...     out.append(4)  
...     return out
```

- Arguments are passed by reference, i.e. without making a copy
- Make sure that functions do not modify mutable arguments!
  - Make copies
  - Avoid changing objects in the first place