



Lab 2: Functions

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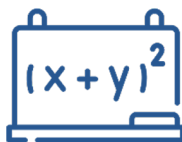
GitHub Classroom



Lab 2 - Functions in python

Functional programming

Functional programming is a programming paradigm
where everything is a function



Even arithmetic
operators



Even
assignments



Even function
definitions

LISP



LISP is an ancient functional
programming language

```
# Python code
def foo(x):
    a = x * 5
    b = (6 + a) / 3 ** 2
    print(b)
```

```
;; LISP code (line-by-line)
(defun foo (x)
  (let ((a (* x 5))
        (b (/ (+ 6 a) (pow 3 2))))
    (print b)))
```

Functional programming

In this lab, we will mimic a functional programming style!

Note: Keep in mind that it's **highly impractical** to mimic like this, however the purpose of this exercise is to familiarize yourselves with functions

Of course, we can't do everything as a function: assignments and function definitions will remain. We will only work on arithmetic operations

Arithmetic operations

$+$	\rightarrow	<code>add()</code>	$/$	\rightarrow	<code>div()</code>	$*$	\rightarrow	<code>mult()</code>
$-$	\rightarrow	<code>sub()</code>	$**$	\rightarrow	<code>exp()</code>			

How are we going to implement them?

Functional programming

Example when replacing original operators with functions

Python code

```
a = 5  
b = (6 + a) / 3 ** 2  
print(b)
```

To functional



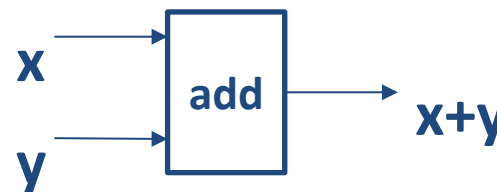
Functional variant

```
a = 5  
b = div(add(6, a), exp(3, 2))  
print(b)
```

What is the behavior of `add(a,b)`?

What is the behavior of `add()`

- How many inputs?
- How many outputs?
- What will be the output?



```
# add()  
def add(a,b) :  
    return a + b
```

Task 1

Implement the following functions



$\text{exp}(2,4) = 2 * 2 * 2 * 2$

Also add `neg()` and `sqrt()`

- E.g., `neg(5)` should return -5, `neg(-5)` should return 5
- E.g., `sqrt(16)` should return 4

Follow the comments in "func.py"

Conditions

- Do not import anything
- Do not use any techniques not taught in class yet

Task 2

The next task is to reproduce the result of task 1 of Lab 1 : the quadratic formula

Except this time, use only the six functions above
(variable assignments can be done as usual, of course)

Conditions

- Do not import anything
- No outside function
- No arithmetic operators outside your functions