# Exercise: Decorators

Problems for exercise and homework for the [Python OOP Course @SoftUni](https://softuni.bg/courses/python-oop).

Submit your solutions in the SoftUni judge system at <https://judge.softuni.bg/Contests/1947>.

## Logged

Create a decorator called logged. It should **return** the name of the function that is being called and its parameters. It should also return the **result of the execution** of the function being called. See the examples for more clarification.

### Examples

|  |  |
| --- | --- |
| **Test Code** | **Output** |
| @logged  def func(\*args):  return 3 + len(args)  print(func(4, 4, 4)) | you called func(4, 4, 4)  it returned 6 |
| @logged  def sum\_func(a, b):  return a + b  print(sum\_func(1, 4)) | you called sum\_func(1, 4)  it returned 5 |

### Hints

* Use {func}.\_\_name\_\_ to get the name of the function
* Call the function to get the result
* Return the result

## Even Parameters

Create a decorator function called **even\_parameters**. It should check if **all parameters** passed to a function are **even numbers** and only then **execute** the function and **return** the result. Otherwise, **don't execute** the function and return **"Please use only even numbers!"**

### Examples

|  |  |
| --- | --- |
| **Test Code** | **Output** |
| @even\_parameters  def add(a, b):  return a + b  print(add(2, 4))  print(add("Peter", 1)) | 6  Please use only even numbers! |
| @even\_parameters  def multiply(\*nums):  result = 1  for num in nums:  result \*= num  return result  print(multiply(2, 4, 6, 8))  print(multiply(2, 4, 9, 8)) | 384  Please use only even numbers! |

## Bold, Italic, Underline

Create **three decorators**: **make\_bold**, **make\_italic**, **make\_underline**, which will have to **wrap** a **text** returned from a function in **<b></b>**, **<i></i>** and **<u></u>** **respectively**.

### Examples

|  |  |
| --- | --- |
| **Test Code** | **Output** |
| @make\_bold  @make\_italic  @make\_underline  def greet(name):  return f"Hello, {name}"  print(greet("Peter")) | <b><i><u>Hello, Peter</u></i></b> |
| @make\_bold  @make\_italic  @make\_underline  def greet\_all(\*args):  return f"Hello, {', '.join(args)}"  print(greet\_all("Peter", "George")) | <b><i><u>Hello, Peter, George</u></i></b> |

***Note: Submit all the decorator functions in the judge system***

## Type Check

Create a decorator called type\_check. It should receive a type (int**/**float**/**str**/…**), and it should check if the parameter passed to the decorated function is of the **type** given to the decorator. If it is, **execute** the function and **return the result**, otherwise **return "**Bad Type**"**.

### Examples

|  |  |
| --- | --- |
| **Test Code** | **Output** |
| @type\_check(int)  def times2(num):  return num\*2  print(times2(2))  print(times2('Not A Number')) | 4  Bad Type |
| @type\_check(str)  def first\_letter(word):  return word[0]  print(first\_letter('Hello World'))  print(first\_letter(['Not', 'A', 'String'])) | H  Bad Type |

## Cache

Create a decorator called cache. It should store all the returned values of the **recursive function** fibonacci. You are provided with this code:

**def** cache(func):

*#* ***TODO: Implement***

@cache

**def** fibonacci(n):

**if** n < 2:

**return** n

**else**:

**return** fibonacci(n-1) + fibonacci(n-2)

You need to create a **dictionary** called log that will store all the **n**'s (**keys**) and the **returned results** (**values**) and **attach** that dictionary to the fibonacci function as a variable called **log**, so when you call it, it returns that dictionary. For more clarification, see the examples

### Examples

|  |  |
| --- | --- |
| **Test Code** | **Output** |
| fibonacci(3)  print(fibonacci.log) | {1: 1, 0: 0, 2: 1, 3: 2} |
| fibonacci(4)  print(fibonacci.log) | {1: 1, 0: 0, 2: 1, 3: 2, 4: 3} |

## HTML Tags

Create a decorator called tags. It should receive an HTML tag as a parameter, **wrap** the result of a function with the given tag and **return the new result**. For more clarification, see the examples below

### Examples

|  |  |
| --- | --- |
| **Test Code** | **Output** |
| @tags('p')  def join\_strings(\*args):  return "".join(args)  print(join\_strings("Hello", " you!")) | <p>Hello you!</p> |
| @tags('h1')  def to\_upper(text):  return text.upper()  print(to\_upper('hello')) | <h1>HELLO</h1> |

## \*Store Results

Create a **class** called **store\_results**. It should be used as a **decorator** and **store information** about the executed functions in a **file** called **results.txt** in the format: **"Function {func\_name} was add called. Result: {func\_result}"**

***Note: The solutions to this problem cannot be submitted in the judge system***

### Examples

|  |  |
| --- | --- |
| **Test Code** | **results.txt** |
| @store\_results  def add(a, b):  return a + b  @store\_results  def mult(a, b):  return a \* b  add(2, 2)  mult(6, 4) | Function 'add' was called. Result: 4  Function 'mult' was called. Result: 24 |

## Execution Time

Import the **time** module. Create a decorator called exec\_time. It should calculate how much **time** a function needs to be **executed**. See the examples for more clarification.

***Note: You might have different results from the given ones. The solutions to this problem cannot be submitted in the judge system.***

### Examples

|  |  |
| --- | --- |
| **Test Code** | **Output** |
| @exec\_time  def loop(start, end):  total = 0  for x in range(start, end):  total += x  return total  print(loop(1, 10000000)) | 0.8342537879943848 |
| @exec\_time  def concatenate(strings):  result = ""  for string in strings:  result += string  return result  print(concatenate(["a" for i in range(1000000)])) | 0.14537858963012695 |
| @exec\_time  def loop():  count = 0  for i in range(1, 9999999):  count += 1  print(loop()) | 0.4199554920196533 |

### Hints

* Use the time library to start a timer
* Execute the function
* Stop the timer and return the result