# Lab: Class and Static Methods

This document defines the exercises for the ["Python OOP" course at @Software University.](https://softuni.bg/trainings/4371/python-oop-february-2024)

Please submit your solutions (source code) to all the below-described problems in [Judge](https://judge.softuni.org/Contests/2430/Static-and-Class-Methods-Lab).

## Calculator

Create a class called **Calculator** that has the following **static methods**:

* **add(\*args)** - **sums** all the arguments passed to the function and **returns the result**
* **multiply(\*args)** - **multiplies** all the numbers and **returns the result**
* **divide(\*args)** - **divides** all the numbers (starting from the first one) and returns the **result**
* **subtract(\*args)** - **subtracts** all the numbers (starting from the first one) and returns the **result**

### Examples

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| **Test Code** |
| print(Calculator.add(5, 10, 4))  print(Calculator.multiply(1, 2, 3, 5))  print(Calculator.divide(100, 2))  print(Calculator.subtract(90, 20, -50, 43, 7)) |
| **Output** |
| 19  30  50.0  70 |

## Shop

Create a class called **Shop**. Upon initialization, it should receive a **name** (str), **type** (str), and **capacity** (int). The store should also have an **attribute** called **items** (an empty **dictionary** that stores the **name** of an item and its **quantity**). The class should have **4 methods**:

* **small\_shop(name: str, type: str)** - a **new shop with a capacity of 10** should be created
* **add\_item(item\_name: str)** - adds **1** to the quantity of the given **item**. On **success**, the method should **return "{item\_name} added to the shop"**. If the addition is **not possible**, the following message should be returned **"Not enough capacity in the shop"**
* **remove\_item(item\_name:str, amount:int)** - **removes** the given amount from the **item**. On **success**, it should return **"{amount} {item\_name} removed from the shop"**. **Otherwise**, the method should return **"Cannot remove {amount} {item\_name}"**
  + If the item **quantity** reaches **0**, the **item** should be **removed from the items' dictionary**.
* **\_\_repr\_\_()** - returns a string representation in the format **"{shop\_name} of type {shop\_type} with capacity {shop\_capacity}"**

### Examples

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| **Test Code** |
| fresh\_shop = Shop("Fresh Shop", "Fruit and Veg", 50)  small\_shop = Shop.small\_shop("Fashion Boutique", "Clothes")  print(fresh\_shop)  print(small\_shop)  print(fresh\_shop.add\_item("Bananas"))  print(fresh\_shop.remove\_item("Tomatoes", 2))  print(small\_shop.add\_item("Jeans"))  print(small\_shop.add\_item("Jeans"))  print(small\_shop.remove\_item("Jeans", 2))  print(small\_shop.items) |
| **Output** |
| Fresh Shop of type Fruit and Veg with capacity 50  Fashion Boutique of type Clothes with capacity 10  Bananas added to the shop  Cannot remove 2 Tomatoes  Jeans added to the shop  Jeans added to the shop  2 Jeans removed from the shop  {} |

## Integer

Create a class called **Integer**. Upon initialization, it should receive a single parameter **value** (**int**). It should have **3 additional methods**:

* **from\_float(float\_value)** - creates a **new instance** by **flooring** the provided floating number. If the value is **not a float**, return the message **"value is not a float"**
* **from\_roman(value)** - creates a **new instance** by converting the **roman** number (**as string**) to an integer
* **from\_string(value)** - creates a **new instance** by converting the **string** to an integer (if the value **cannot be converted**, return a message **"wrong type"**)

### Examples

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| **Test Code** |
| first\_num = Integer(10)  print(first\_num.value)  second\_num = Integer.from\_roman("IV")  print(second\_num.value)  print(Integer.from\_float("2.6"))  print(Integer.from\_string(2.6)) |
| **Output** |
| 10  4  value is not a float  wrong type |

## Hotel Rooms

In a folder called **project** create two files: **hotel.py** and **room.py**

In the **room.py** file, create a class called **Room**. Upon **initialization**, it should receive a **number** (**int**) and a **capacity** (**int**). It should also have an **attribute** called **guests** (**0** by default) and **is\_taken** (**False** by default). The class should have **2 additional methods**:

* **take\_room(people)** - if the room is **not taken**, and there is **enough space**, the guests take the room. Otherwise, the method should return **"Room number {number} cannot be taken"**
* **free\_room()** - if the room **is taken**, free it. Otherwise, return **"Room number {number} is not taken"**

In the **hotel.py** file, create a class called **Hotel**. Upon initialization, it should receive a **name** (**str**). It should also have 2 **more attributes**: **rooms** (empty **list** of rooms) and **guests** (**0** by default). The class should have **5 more methods**:

* **from\_stars(stars\_count: int)** - creates a new instance with name **"{stars\_count} stars Hotel"**
* **add\_room(room: Room)** - adds the room to the list of rooms
* **take\_room(room\_number, people)** - finds the room with that **number** and tries to **accommodate** the **guests** in the room
* **free\_room(room\_number)** - finds the room with that **number** and tries to **free it**
* **status()** - **returns** information about the hotel in the following format:

**"Hotel {name} has {guests} total guests  
Free rooms: {numbers of all free rooms separated by comma and space}**

**Taken rooms: {numbers of all taken rooms separated by comma and space}"**

### Examples

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| **Test Code** |
| from project.hotel import Hotel  from project.room import Room  hotel = Hotel.from\_stars(5)  first\_room = Room(1, 3)  second\_room = Room(2, 2)  third\_room = Room(3, 1)  hotel.add\_room(first\_room)  hotel.add\_room(second\_room)  hotel.add\_room(third\_room)  hotel.take\_room(1, 4)  hotel.take\_room(1, 2)  hotel.take\_room(3, 1)  hotel.take\_room(3, 1)  print(hotel.status()) |
| **Output** |
| Hotel 5 stars Hotel has 3 total guests  Free rooms: 2  Taken rooms: 1, 3 |