# Lab: Classes and Objects

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/1936/Classes-and-Objects-Lab).

## Vehicle

Create a class called Vehicle. Upon initialization, it should receive **max\_speed** (integer, **optional**; **150** by default) and **mileage** (number). Create an instance variable called **gadgets** - an empty list by default.

### Examples

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| --- | --- |
| **Test Code** | **Output** |
| car = Vehicle(20)  print(car.max\_speed)  print(car.mileage)  print(car.gadgets)  car.gadgets.append('Hudly Wireless')  print(car.gadgets) | 150  20  []  ['Hudly Wireless'] |

## Point

Create a class called **Point**. Upon initialization, it should receive **x** and **y** (**numbers**). Create **3 instance methods**:

* **set\_x(new\_x)** - **changes the x value** of the point
* **set\_y(new\_y)** - **changes the y value** of the point
* **\_\_str\_\_()** - returns the **coordinates of the point in the format "The point has coordinates ({x},{y})"**

### Examples

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| --- | --- |
| **Test Code** | **Output** |
| p = Point(2, 4)  print(p)  p.set\_x(3)  p.set\_y(5)  print(p) | The point has coordinates (2,4)  The point has coordinates (3,5) |

## Circle

Create a class called **Circle**. Upon initialization, it should receive a **radius** (**number**). Create a class attribute called **pi** which should be equal to **3.14**. Create **3 instance methods**:

* **set\_radius(new\_radius)** - changes the **radius**
* **get\_area()** - returns the **area of the circle**
* **get\_circumference()** - returns the **circumference of the circle**

### Examples

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| **Test Code** | **Output** |
| circle = Circle(10)  circle.set\_radius(12)  print(circle.get\_area())  print(circle.get\_circumference()) | 452.16  75.36 |

## Glass

Create a class called **Glass**. Upon initialization, it will **not receive any parameters**. You must create an **instance attribute** called **content** which should be equal to **0**. You should also create a **class attribute** called **capacity** which should be **250 ml**. Create **3 instance methods**:

* **fill(ml)** - fills the glass with the given milliliters if there is **enough space** in it and returns **"Glass filled with {ml} ml"**, otherwise returns **"Cannot add {ml} ml"**
* **empty()** - empties the glass and returns **"Glass is now empty"**
* **info()** - returns info about the glass in the format **"****{space\_left} ml left"**

### Examples

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| --- | --- |
| **Test Code** | **Output** |
| glass = Glass()  print(glass.fill(100))  print(glass.fill(200))  print(glass.empty())  print(glass.fill(200))  print(glass.info()) | Glass filled with 100 ml  Cannot add 200 ml  Glass is now empty  Glass filled with 200 ml  50 ml left |

## Smartphone

Create a class called **Smartphone**. Upon initialization, it should receive a **memory** (number). It should also have **2 other instance attributes**: **apps** (empty list by default) and **is\_on** (False by default). Create **3 methods**:

* **power()** - sets **is\_on** to **True** if the phone is off, otherwise sets it to **False**
* **install(app, app\_memory)**
  + If there is **enough memory** on the phone and it **is on**, install the app (**add it to apps** and **decrease the memory** of the phone) and return **"Installing {app}"**
  + If there **is enough memory**, but the **phone is off**, returns **"Turn on your phone to install {app}"**
  + Otherwise, returns **"Not enough memory to install {app}"**
* **status()** - returns **"Total apps: {total\_apps\_count}. Memory left: {memory\_left}"**

### Examples

|  |  |
| --- | --- |
| **Test Code** | **Output** |
| smartphone = Smartphone(100)  print(smartphone.install("Facebook", 60))  smartphone.power()  print(smartphone.install("Facebook", 60))  print(smartphone.install("Messenger", 20))  print(smartphone.install("Instagram", 40))  print(smartphone.status()) | Turn on your phone to install Facebook  Installing Facebook  Installing Messenger  Not enough memory to install Instagram  Total apps: 2. Memory left: 20 |