Advanced Programming in Python, Group B
Jacobs University Bremen
Dr. Kinga Lipskoch

Course: JTSK-350112
April 20th, 2018

# Assignment 2 - Object-oriented Programming and Classes

- The problems of this assignment must be solved in Python.
- The TAs are grading solutions to the problems according to the following criteria: https://grader.eecs.jacobs-university.de/courses/350112/2018_1gB/Grading-Criteria-Python.pdf

## Problem 2.1 *Use of constructor* (1 point)

**Presence assignment, due by 18:30 h today**
Download the file:
https://grader.eecs.jacobs-university.de/courses/350112/python/student.py
Change the constructor of the `Student` class in `student.py` such that it prints on the screen "`Constructor being called`" each time it is called.
Write a program that creates three students with the names "`Jenny`", "`Steve`" and "`Celine`". They have all received a score of 95 in their first quiz, and 90 in their second quiz.

## Problem 2.2 *Playing craps* (1 point)

**Presence assignment, due by 18:30 h today**
Download the files:
https://grader.eecs.jacobs-university.de/courses/350112/python/die.py
https://grader.eecs.jacobs-university.de/courses/350112/python/craps.py
Write a short test program called `test_craps.py` to play craps (i.e., to test the functionality provided by the `Player` class from `craps.py`).

## Problem 2.3 *Rational numbers* (1 point)

Download the file:
https://grader.eecs.jacobs-university.de/courses/350112/python/rational.py
Understand the `Rational` class from `rational.py`. Write a test program called `test_rational.py` that uses the class and its methods to compute $\frac{1}{2} + \frac{1}{8}$. Print the result on the screen.

## Problem 2.4 *Extend `Student` class* (1 point)

Define a method `setName()` within the `Student` class that allows you to change the name of a student. Write a simple test program called `test_student.py` that tests this method. For example, create a student named "`John`" with score 100 for the first quiz, 95 for the second quiz and 50 for the third quiz. Then change his name to "`Jack`". Print the information about the student on the screen before and after changing it.

## Problem 2.5 *Change `Student` class* (1 point)

Within the `Student` class the age of a student should be stored as well. Change the constructor and add the methods called `setAge()` and `getAge()`. Extend your test program from **Problem 2.4** as well such that it tests the changed constructor and the methods.

## Problem 2.6 *`Circle` class* (2 points)

Write a program called `circle.py` which contains the definition and implementation of a class called `Circle`. The class should contain the following components:

- two private properties of the class: `radius` (of the type `float`) and `color` (of the type `string`)
- class constructor: a constructor which takes a `float` argument for radius and a `string` argument for the color with the default values of `1.0` for the radius and "`red`" for the color

- class methods: `getRadius()`, `getColor()`, `setRadius()`, `setColor()`, `getArea()` for returning the area of the current instance, `getPerimeter()` for returning the perimeter of the current instance
- overloaded + and − operators: for adding and subtracting two `Circle` instances by adding and subtracting their corresponding areas

Write a test program called `test_circle.py` which creates two instances of `Circle` and tests the constructors, the methods and the overloaded operators from above.

## How to submit your solutions

Name the programs a2_*x*.py.
Each program **must** include a comment on the top like the following:

```
# JTSK-350112
# a2_1.py
# Firstname Lastname
# myemail@jacobs-university.de
```

You have to submit your solutions via *Grader* at
**`https://grader.eecs.jacobs-university.de`**.

If there are problems (but only then) you can submit the programs by sending mail to
`k.lipskoch@jacobs-university.de` **with a subject line that starts with `JTSK-350112`**.

Please note, that after the deadline it will not be possible to submit solutions. It is useless to send solutions then by mail, because they will not be accepted.

*Your code must compile without any warning under python3.x.*

**This assignment is due by Wednesday, April 25th, 10:00 h**