Introduction to CS for Data Science

HW3 – Classes

In this exercise you are going to implement a class that represents a rational number.

A rational number $n \in Q$, is any number that can be expressed as the fraction p/q of two integers: a numerator p and a non-zero denominator q.

Implementation Steps:

1. Create a class called number that has 4: methods: addition, subtraction, multiplication, division, check_equal. The only commands that these methods should contains is "pass" (i.e we do not actually fully implement them but rather place them as placeholders for the inhering classes). The input to each such method is another "number".
2. Create a class named Rational that inherits from "number" and has two private variables, p and q that represents that numerator and denominator of the rational number.
3. Overload the functions of number in the following way:
    a. Addition – This function receives another rational number and adds it to the current one.
    b. Subtraction - This function receives another rational number and subtracts it from the current one.
    c. Multiplication - This function receives another rational number and Multiplies it with the current one.
    d. Division - This function receives another rational number and divides the current one with it.
    e. check_equal – This function receives another rational number and checks if it is equal to the current one. (note that 2/4 is equal to ½).
4. Add static methods to the class that do all the 4 operations in section 2. These functions receive two rational numbers and return the result of the operations. Note that the original numbers should not be changed. (hint use the functions that you already defined inside the static functions).
5. Create a class named Integer that inherits from "number" and has a private variable named number that holds its value.
    a. Overload number's methods as before.
    b. Add a method called to_rational that receives a denominator q and converts the integer to a rational number given q.
6. Add support to operations with integer numbers in the Rational class. Hint: use the isinstance(a, object) to determine the class of the input object and act accordingly.
7. Implement for both classes the __str__ method. For the integer just return its value. For the Rational Classes return the actual number and the denominator\ numerator representation.

Read the following submission guidelines carefully:

a. This exercise is to be submitted individually.

b. All submissions must be zipped and submitted as an archive file with your ID as a filename. For example, compress all relevant files using zip and name it ‘123456789.zip’.