

Laboratory 11

In this set, we are going to build a class for rational numbers.

1. Euclid's algorithm for the greatest common divisor: Implement Euclid's algorithm given below

```
function gcd(a,b):
    if b is 0:
        return a
    else:
        return gcd(b, a%b)
```

2. Define the class Rational. The class has two integer fields, numerator and denominator. Only the numerator can be negative. The init-function takes two integers as arguments. If the prospective denominator is zero, a ZeroDivision exception should be raised. Both numerator and denominator should be divided by their gcd. For example, if the prospective numerator is -24 and the prospective denominator is -36, then the stored numerator is 2 and the stored denominator is 3.
3. Define a string function (`__str__`) that returns for example "-10/9" if the stored numerator is -10 and the stored denominator is 9.
4. Overwrite addition, subtraction, multiplication, and division. Remember that numerator and denominator need to be free of common divisors. This however should be taken care of by the initializer. Also, raise a Zero Division Exception for a division by zero.
5. Create a method `tofloat` that returns the floating point value of a rational number.
6. Create comparison operators for equality, inequality, smaller, greater, smaller or equal, and greater or equal.