

Exercise:

This homework is about practicing Object Oriented Programming concepts. Download the file **Fraction.m** from OdtuClass page; it is an incomplete class definition.

Please read the explanations, execute the experiments, and answer the short questions in the steps. Complete the methods as they are described. You need to submit two files:

- a. **WORD File** including your answers for the short questions.
- b. The updated version of **Fraction.m** (You can keep the name as Fraction.m)

Here are the specific things to note and do:

1. Read the class comments carefully. In our simple **Fraction** class, we simply assume the followings:
 - The numerator and denominator are integers—we do not check for this,
 - A Fraction does not need to be in the reduced form, i.e., 16/6 is fine and does not need to be reduced to 8/3,
 - A negative fraction should have the negative sign associated with the numerator, not denominator.

This and other requirements of our Fraction are taken care of already in the constructor. Read it carefully.

2. Complete method **isLessThan** regarding the comments. Save the file, clear the Workspace, create Fractions **a** and **b** and call the **isLessThan** method for the following and answer the short questions.

```
a= Fraction(3,4)
b= Fraction(3,6)

a.isLessThan(b)      %True or false? False
b.isLessThan(a)      %True or false? True
```

3. Complete method **isEqualTo** regarding the comments. Save the file, clear the Workspace, create Fractions **a**, **b** and **c** and call the **isEqualTo** method for the following and answer the short questions.

```
a= Fraction(3,4)
b= Fraction(3,6)
c= Fraction(1,2)

a.isEqualTo(b)        %True or false? False
b.isEqualTo(c)        %True or false? True
```

4. Complete method **add** and then execute the following statements:

```
a= Fraction(3,4)
b= Fraction(3,6)
c= a.add(b)
```

What is the resulting fraction **c**? 30/24

5. Complete method **toDouble** and then try these statements:

```
a= Fraction(3,4)
x= a.toDouble()
```

What is the resulting value of **x**? 0.7500

6. Complete method **reduce**. You can use any algorithm you like for calculating the GCD, Greatest Common Divisor, but here you may find Euclid's algorithm for finding the GCD between two positive values a and b where $a \leq b$:

1. Calculate the remainder r from b divided by a.
2. If r is zero than a is the GCD.
3. Otherwise, let b get a and a get r. Repeat from Step 1.

Note that if the numerator is zero or **Inf** then the fraction cannot be reduced (is already in the reduced form). To check whether a variable **x** has the value **Inf**, use the function **isinf** (**isinf(x)** returns true (1) if **x** is **Inf** and false (0) otherwise).

After completing method **reduce**, try these statements in the Command Window and answer the questions:

```
a= Fraction(8,6)
a.reduce()
```

What does your program return?

```
>> a = Fraction(8,6)
```

```
a =
```

```
4/3
```

```
>> a.reduce()
```

```
>>
```

```
a= Fraction(8,6);
a.reduce();
disp(a)
```

What does your program return? 4/3

```
a= Fraction(0,9);
a.reduce();
disp(a)
```

What does your program return? 0/9

```
a= Fraction(9,0);
a.reduce();
disp(a)
```

What does your program return? Inf/1