

Problem Set 5

- Create a class called **RationalNumber** for performing arithmetic with fractions. Write a driver program to test your class

Use integer variables to represent the data of the class—the numerator and the denominator. Provide a constructor that enables an object of this class to be initialized when it is declared. The constructor should contain default values, in case no initializers are provided, and should store the fraction in reduced form (i.e., the fraction

$$\frac{2}{4}$$

would be stored in the object as 1 in the numerator and 2 in the denominator). Provide methods for each of the following:

- a) Adding two **RationalNumbers**. The result should be stored in reduced form.
 - b) Subtracting two **RationalNumbers**. The result should be stored in reduced form.
 - c) Multiplying two **RationalNumbers**. The result should be stored in reduced form.
 - d) Dividing two **RationalNumbers**. The result should be stored in reduced form.
 - e) Printing **RationalNumbers** in the form **a/b**, where **a** is the numerator and **b** is the denominator.
 - f) Printing **RationalNumbers** in floating-point format.
- Create a class **Rectangle**. The class has attributes `__length` and `__width`, each of which defaults to 1. It has methods that calculate the **perimeter** and the **area** of the rectangle. It has *set* and *get* methods for both `__length` and `__width`. The *set* methods should verify that `__length` and `__width` are each floating-point numbers larger than 0.0 and less than 20.0. Write a driver program to test the class.
 - Write an inheritance hierarchy for class **Quadrilateral**, **Trapezoid**, **Parallelogram**, **Rectangle** and **Square**. Use **Quadrilateral** as the base class of the hierarchy. Make the hierarchy as deep (i.e., as many levels) as possible. The data of **Quadrilateral** should be the (x, y) coordinate pairs for the four endpoints of the **Quadrilateral**. Write a driver program that creates and displays objects of each of these classes.