OrderedArrayList Class and Rational Number Class

Introduction

A number is called a rational number if there are two integers with such that can be expressed as —. We would like to develop a class called **RationalNumber** for performing arithmetic with fractions. The class uses integer variables to represent the private data, namely, the numerator and the denominator. The class provides a constructor function that enables an object of the class to be initialized when it is declared. The constructor should contain default values in case no initial values are provided and should store the rational number in reduced form (e.g., the fraction 2/4 would be stored in the object as 1 in the numerator and 2 in the denominator). The class also provides public member functions for each of the following:

1. **set** and **get** member functions for both the numerator and denominator.
2. Addition of two rational numbers. The result should be stored in reduced form.
3. Subtraction of two rational numbers. The result should be stored in reduced form.
4. Multiplication of two rational numbers. The result should be stored in reduced form.
5. Division of two rational numbers. The result should be stored in reduced form.
6. The reciprocal of a rational number. The result should be stored in reduced form.
7. Printing rational numbers in the form **a/b** where **a** is the numerator and **b** is the denominator.
8. Printing rational numbers in floating point format.

In addition,

1. The class enables input and output of rational numbers through the overloaded and operators, respectively.
2. Overload the addition, subtraction, multiplication, and division operators to enable addition, subtraction, multiplication, and division of two rational numbers as in algebra.
3. Overload the assignment operator.
4. Overload the , , , , , and operators to allow comparisons of rational numbers.

Problem Statement

Use inheritance to derive a class called **OrderedArrayList** from the **ArrayList** class developed in class. The **OrderedArrayList** class maintains the objects in the list in an increasing order. Develop the **RationalNumber** class as described above. Write a program that tests the **OrderedArrayList** class using the **RationalNumber** class.

Submission Instructions

Submit the following deliverables in the drop box dedicated for this assignment.

- A zip file of your project renamed using the following naming convention:

  LastName-FristName-AssignmentNumber.zip

  The zip file must include at least the following files: **RationalNumber.h**, **RationalNumber.cpp** (if applicable), **OrderedArrayList.h**, and **MainDriver.cpp**.