ECE 3400
Foundations of Programming
Assignment 3
A Rational Class
Due: Oct. 20, 2025

Reza Shahidi

1 Assignment Specification

Develop a class `Rational` that represents a rational number (i.e., a number of the form x/y, where x and y are integers and $y \neq 0$). The class should satisfy the following requirements:

1. A type member `Integer` should be provided that corresponds to the integer type used to represent the numerator and denominator of the Rational number.
2. A constructor should be provided that takes two arguments corresponding to the numerator and denominator values of the rational number, respectively. The first argument should default to zero. The second argument should default to one.
3. The class should provide move and copy constructors, move and copy assignment operators, and a destructor.
4. The addition, subtraction, multiplication and division operators should be provided.
5. The `+=`, `-=`, `*=`, and `/=` operators should be provided.
6. A member function `toDouble` should be provided that returns the best approximation of the rational number as a **double**.
7. A stream inserter should be provide to write a rational number to an output stream (`std::ostream`) using a format like "-15/23".
8. All data members should be private.

In order to simplify the implementation, you do not need to maintain a rational number in reduced form (so that the numerator and denominator are coprime). You are provided the header file which contains the interface for the class and you should provide the implementation of any non-implemented functions and operators in a source file called Rational.cpp.

(b) Explain why maintainting a rational number in reduced form (i.e., such that the numerator and denominator are coprime) would be desirable in many applications (although this is not done in this assignment).

Please submit your final code (both header and implementation), making sure you **do not include a main function** to Gradescope when complete.

You may start from the template Github repository at `https://classroom.github.com/a/-_v1Ae4j` if you wish.