Taken from Java – An Introduction to Problem Solving and Programming 7th edition, by Walter Savtich

Rational Numbers

Write and fully test a class that represents rational numbers. A rational number can be represented as the ratio of two integer values, *a* and *b*, where *b* is not *zero*. The class has attributes for the numerator and denominator of this ratio. The ratio should always be stored in its simplest form. That is, any common factor of a and b should be removed. For example, the rational number 40/12 should be stored as 10/3.

The class has the following constructors and methods:

- A default constructor that sets the rational number to 0/1.
- A constructor that has parameters for the numerator and denominator and converts the resulting ratio to simplified form.
- `simplify()` – a private method that converts the rational number to simplified form.
- `getGCD(x,y)` – a private static method that returns the largest common factor of the two positive integers x and y, that is, their greatest common divisor. For example, the greatest common divisor of 40 and 12 is 4.
- `getValue()` – returns the rational number as a double value.
- `toString()` – returns the rational number as a string in the form a/b.