Program the following task in your C++ compiler. Keep compiling and executing even after writing a single line of code.

ADT: RationalNumber

Write a class to represent rational numbers. A rational number is a "ratio-nal" number composed of two integers, with division indicated but not carried out. Examples include 1/2, 2/3, 15/32, 65/4, 16/5.

1. Rational numbers are represented by two values:

    1) An integer named **numerator** displayed above a line or before a slash.
    2) An integer named **denominator** displayed below or after that line.

    Value should only be assigned to the denominator if it is non-zero; otherwise, it should default to 1.

2. Provide constructors to create objects with legal values:

    - A constructor that accepts the Rational Number's **numerator** and **denominator** as arguments and assigns them to the appropriate member variables.

    - Since every integer is also a rational number (e.g., 2/1 or 17/1), provide a constructor with a single integer parameter that accepts only the value of the numerator as an argument and assigns it to the appropriate member variable.

3. Implement mutators for the **numerator** and **denominator** data members of the class.

4. Implement accessors for the **numerator** and **denominator** data members of the class.

5. Overload the following operators:

    - **Stream-insertion** operator (<<) to write rational numbers in the form 2/3 or 37/51 on the screen.

    - **Stream-extraction** operator (>>) to input rational numbers in the form 2/3 or 37/51 from the keyboard.

    - **Plus (+)**, **Minus (-)**, **Multiply (*)**, and **Divide (/)** binary operators to perform arithmetic operations on two rational numbers.

    - **Less-than (<)** and **Equal (==)** binary operators to compare two rational numbers.

    - **Minus (-)** unary operator to convert a rational number into its negative form.

    - **Logical not (!)** unary operator to return true if the rational number is negative, false otherwise.

6. In the **main** function, demonstrate the functionality of the Rational Number class by creating instances and performing various operations on them.

Utilize the provided formulas for arithmetic operations on rational numbers:

- For addition: $(a/b) + (c/d) = (ad + bc) / (bd)$
- For subtraction: $(a/b) - (c/d) = (ad - bc) / (bd)$
- For multiplication: $(a/b) \times (c/d) = (ac) / (bd)$
- For division: $(a/b)/(c/d) = (ad) / (cb)$
- For negation: $-(a/b) = (-a) / b$
- For comparison: $(a/b) < (c/d) \ if \ (ad) < (cb)$
- For equality: $(a/b) = (c/d) \ if \ (ad) = (cd)$

Ensure that any sign is carried by the numerator and keep the denominator positive.

☺☺☺ **Ever tried. Ever failed. No matter. Try Again. Fail again. Fail better.** ☺☺☺