Exercise

re-write Rational based on long rather than int.

Exercise

re-write Rational based on java.math.BigInteger.

Exercise (hand)

add another valueOf() method that converts double to Rational.
\[ \text{Reciprocal} \quad z = a + bi \]

\[ \frac{1}{z} = \frac{\bar{z}}{\bar{z} z} = \frac{\bar{z}}{|z|^2} \]

i.e.

\[ \frac{1}{a + bi} = \frac{a - bi}{(a + bi)(a - bi)} = \frac{a - bi}{a^2 + b^2} \]

\[ = \left( \frac{a}{a^2 + b^2} \right) + \left( \frac{-b}{a^2 + b^2} \right) i \]

\[ \text{Divide} \quad z = a + bi, \ w = c + di \]

\[ \frac{w}{z} = \frac{w \bar{z}}{\bar{z} z} = \frac{(c + di)(a - bi)}{a^2 + b^2} \]

\[ = \left( \frac{ac + bd}{a^2 + b^2} \right) + \left( \frac{ad - bc}{a^2 + b^2} \right) i \]
Note:

\[ a \times (b + c) \quad \text{equiv to} \quad (a \times b) + c \]

may not be

not in floating point arithmetic.

Ex. Vector.java

Exercise (hand)

modify constructor from String so it takes "x1+y1+z1" or "x1+y1+z2".
Exercise

Write a class called `Matrix` that represents 2x2 matrices. Include methods `add()`, `sub()`, `mul()`, `scalarMul()`, `det()`, `inverse()`

\[
\text{det} \begin{pmatrix} a & b \\ c & d \end{pmatrix} = ad - bc
\]