THEORETICAL PART:

Definition:

A **rational expression** is an expression that can be written as a ratio of two polynomials $\frac{P}{Q}$. Such a fraction is undefined for any value(s) of the variable(s) for which $Q = 0$. A given rational expression is **simplified** or **reduced** when P and Q contain no common factors (other then 1 or -1).

Definition:

A **complex rational expression** is a fraction in which the numerator or denominator (or both) contains at least one rational expression.

Caution: Only common factors can be canceled!

$$\frac{\cancel{x} + 4}{x^2} = \frac{4}{x} \quad \text{is incorrect}$$

PRACTICAL PART:

1. Simplify the following rational expressions, and indicate values of the variable that must be excluded:

(a)

$$\frac{x^3 - 8}{x^2 - 2x} =$$

(b)

$$\frac{x^2 - x - 6}{3 - x} =$$

2. Add or subtract the rational expressions:

(a)

$$\frac{2x-1}{x^2+x-2}-\frac{2x}{x^2-4}=$$

(b)

$$\frac{x+1}{x+3}+\frac{x^2+x-2}{x^2-x-6}-\frac{x^2-2x+9}{x^2-9}=$$

3. Multiply or divide the rational expressions:

(a)

$$\frac{x^2+3x-10}{x+3}\cdot\frac{x-3}{x^2-x-2}=$$

(b)

$$\frac{x^2+5x-14}{3x}\div\frac{x^2-4x+4}{9x^3}=$$

4. Simplify the complex rational expressions:

(a)

$$\frac{\frac{1}{x+h} - \frac{1}{x}}{h} =$$

(b)

$$\frac{x^{-1} - y^{-1}}{x^{-2} - y^{-2}} =$$