

When you are done with your 7.6 homework you should be able to...

- π Simplify a Complex Rational Expression by Simplifying the Numerator and Denominator Separately.
- π Simplify a Complex Rational Expression Using the LCD.

WARM-UP:

1. Factor.

$$8x^2 - 14x - 15$$

2. Find the quotient:

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

Definition

A **complex rational expression** is a fraction in which the numerator and/or the denominator contains the sum or difference of rational expressions.

Steps to Simplify a Complex Rational Expression by Simplifying the Numerator and Denominator Separately (Method 1)

Step 1: Write the numerator of the complex rational expression as a single rational expression.

Step 2: Write the denominator of the complex rational expression as a single rational expression.

Step 3: Rewrite the complex rational expression using the rational expressions determined in step steps 1 and 2.

Step 4: Simplify the rational expression using the techniques for dividing rational expressions.

3. Simplify the complex rational expressions using method 1.

a.
$$\frac{\frac{1}{x} - \frac{1}{y}}{\frac{2}{xy}}$$

b.
$$\frac{\frac{x+1}{6}}{\frac{x^2+3x+2}{3}}$$

Steps to Simplify Complex Rational Expressions Using the LCD (Method 2)

Step 1: Find the least common denominator among each denominator in the complex rational expression.

Step 2: Multiply both the numerator and the denominator of the complex rational expression by the LCD found in step 1.

Step 3: Simplify the rational expression, if possible.

4. Simplify the complex rational expressions using method 2.

a.
$$\frac{\frac{x}{x+1}}{1 + \frac{1}{x-1}}$$

b.
$$\frac{\frac{-6}{y^2 + 5y + 6}}{\frac{2}{y+3} - \frac{3}{y+2}}$$

5. Simplify the complex rational expressions using either method.

a. $1 - \frac{1}{1 - \frac{1}{x-2}}$

b. $1 + \frac{2}{1 + \frac{2}{x + \frac{2}{x}}}$

6. Applications

In a rectangle, the length can be found by dividing the area by the

width. If the area of a rectangle is $\frac{x-4}{x^3} - \frac{2}{x^2}$ and the width is

$\frac{x-4}{x^3} - \frac{2}{x^2}$, write a complex rational expression to find the length and then simplify the complex rational expression.