Lesson 6.3: Complex Rational Expressions

Objectives:

~ Simplify a complex rational expression by simplifying the numerator and denominator separately.

~ Simplify a complex rational expression by using the Least Common Denominator (LCD).

METHOD 1:

Simplify the Numerator and Denominator Separately

Step 1:   Write the numerator of the expression as a single rational expression (add or subtract).

Step 2:   Write the denominator of the expression as a single rational expression (add or subtract).

Step 3:   Rewrite the complex rational expression using your new numerator and denominator you found in steps 1 and 2.

Step 4:   Simplify. (Invert the denominator and multiply, then factor and simplify.)

Example 1: Simplify.

a.) $\dfrac{\dfrac{1}{5}+\dfrac{1}{x}}{\dfrac{x+5}{2}}$

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Example 1: Simplify.

b.) $\dfrac{\dfrac{x}{x-2}+\dfrac{1}{x^2-4}}{x+\dfrac{1}{x+2}}$

METHOD 2:

Simplify using the Least Common Denominator

Step 1: Find the LCD among all the denominators in the complex rational expression.

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

Step 3: Simplify the expression.

Example 2: Simplify.

a.) $\dfrac{\dfrac{1}{5}+\dfrac{1}{x}}{\dfrac{x+5}{2}}$

Example 2: Simplify.

b.) $\dfrac{\dfrac{1}{x}+\dfrac{4}{x-3}}{\dfrac{x}{x^2-9}+\dfrac{1}{x-3}}$

Example 3: Simplify using BOTH methods.

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

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

Solution: $\frac{y-x}{xy}$

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Can you?

Homework:

Pg. 484: # 5, 7, 9, 13, 17, 19, 21, 23, 25, 27, 31, 33, 35, 37, 39

AND

Pg. 487: "Putting the Concepts Together" #1 - 10 all (25 problems)