

## Complex Fractions

**Complex rational expressions** are expressions that have rational expressions in their numerators and/or denominators.

ex:

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

We'll look at two ways to simplify complex rational expressions...

### Way #1: Simplify Top/Bottom, Then Divide

**Ex 1.**

Simplify:

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

**Way #2: Multiply by**  $\frac{\text{LCD}}{\text{LCD}}$ **Ex 2.**

Simplify:

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

**Ex 3.**

Simplify:

$$\frac{1 - \frac{2}{x} - \frac{3}{x^2}}{1 - \frac{5}{x} + \frac{6}{x^2}}$$

**Ex 4.**

Simplify:

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

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**Practice**

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1. Simplify:

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

2. Simplify:

$$\frac{\frac{3}{x+1} - \frac{3}{x-1}}{\frac{5}{x^2-1}}$$

3. Simplify:

$$\frac{\frac{7x}{2x-2} + \frac{x}{x^2-1}}{\frac{4}{x+1} - \frac{1}{3x+3}}$$

4. Simplify:

$$\frac{\frac{6}{5} - \frac{1}{9}}{\frac{2}{5} + \frac{5}{3}}$$

Q: What word can you make by adding letters to each side of XYG? (Hint: add one letter to the left side, and two letters to the right side.)