Rational Expressions

7.3

Complex Fractions

Objective

| 1 | Simplify complex fractions |

Simplify complex fractions

Simplify complex fractions

A **complex fraction** is a fraction in which the numerator or denominator contains one or more fractions. Examples of complex fractions are shown below.

$$\frac{5}{2+\dfrac{1}{2}} \qquad \frac{5+\dfrac{1}{y}}{5-\dfrac{1}{y}} \qquad \frac{x+4+\dfrac{1}{x+2}}{x-2+\dfrac{1}{x+2}}$$

To simplify a complex fraction, rewrite the complex fraction so that no fraction remains in the numerator or denominator. Write the resulting fraction in simplest form.

Example 1

Simplify.

A. $$\dfrac{2 - \dfrac{11}{x} + \dfrac{15}{x^2}}{3 - \dfrac{5}{x} - \dfrac{12}{x^2}}$$

B. $$\dfrac{2x - 1 + \dfrac{7}{x + 4}}{3x - 8 + \dfrac{17}{x + 4}}$$

Solution:

A. $$\dfrac{2 - \dfrac{11}{x} + \dfrac{15}{x^2}}{3 - \dfrac{5}{x} - \dfrac{12}{x^2}} = \dfrac{2 - \dfrac{11}{x} + \dfrac{15}{x^2}}{3 - \dfrac{5}{x} - \dfrac{12}{x^2}} \cdot \dfrac{x^2}{x^2}$$

Multiply the numerator and denominator by the LCD, x^2.

Example 1 – *Solution*

cont'd

$$= \frac{2 \cdot x^2 - \dfrac{11}{x} \cdot x^2 + \dfrac{15}{x^2} \cdot x^2}{3 \cdot x^2 - \dfrac{5}{x} \cdot x^2 - \dfrac{12}{x^2} \cdot x^2}$$

Distributive Property

$$= \frac{2x^2 - 11x + 15}{3x^2 - 5x - 12}$$

$$= \frac{(2x - 5)(x - 3)}{(3x + 4)(x - 3)}$$

$$= \frac{2x - 5}{3x + 4}$$

7

Example 1 – *Solution*

cont'd

B. $\dfrac{2x - 1 + \dfrac{7}{x + 4}}{3x - 8 + \dfrac{17}{x + 4}}$

$= \dfrac{2x - 1 + \dfrac{7}{x + 4}}{3x - 8 + \dfrac{17}{x + 4}} \cdot \dfrac{x + 4}{x + 4}$

Multiply the numerator and denominator by the LCD, **x + 4.**

$= \dfrac{(2x - 1)(x + 4) + \dfrac{7}{x + 4}(x + 4)}{(3x - 8)(x + 4) + \dfrac{17}{x + 4}(x + 4)}$

Distributive Property

Example 1 – *Solution*

cont'd

$$= \frac{2x^2 + 7x - 4 + 7}{3x^2 + 4x - 32 + 17}$$

$$= \frac{2x^2 + 7x + 3}{3x^2 + 4x - 15}$$

$$= \frac{(2x + 1)(x + 3)}{(3x - 5)(x + 3)}$$

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