Sec 9-6

Solving Rational Equations

Method 1: Clear all denominators by multiplying both sides by the LCD.

Method 2: Get all terms to have the same denominator then solve numerator equation.

Method 3: Create a proportion then cross multiply.

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1. $\dfrac{4}{x^2 + 7x + 12} = \dfrac{2}{x^2 - 16}$

$\dfrac{4}{(x+4)(x+3)} \cdot x - 4 = \dfrac{2}{(x \pm 4)} \cdot x + 3)$

$x \neq -4, -3, 4$

$4x - 16 = 2x + 6$

$ -2x \qquad -2x$

$2x - 16 = 6$

$ +16 \quad +16$

$\dfrac{2x}{2} = \dfrac{22}{2}$

$\boxed{x = 11}$

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2. $\dfrac{(x-8)\,3}{(x-8)(x+5)} + \dfrac{x^2 - 8}{x^2 - 3x - 40} = \dfrac{2}{x - 8} \cdot \dfrac{(x+5)}{x+5}$

$(x-8)(x+5)$

$3x - 24 + x^2 - 8 = 2x + 10$

$x^2 + x - 42 = 0$

$(x+7)(x-6) = 0$

$\boxed{x = -7, 6}$

Extraneous Solutions: Solutions that don't make the original equation true.

Solve each.

4. $\dfrac{2x}{x^2-1} = \dfrac{4}{x^2+2x-3}$

5. $\dfrac{x}{x+4} + \dfrac{7}{x-1} = \dfrac{x+34}{x^2+3x-4}$

4. $(x+3)\dfrac{2x}{x^2-1} = \dfrac{4}{x^2+2x-3} \cdot (x+1)$

$(x+3)(x+1)(x-1) \quad (x+3)(x-1) \ (x+1)$

$x \neq -3, \pm 1$

$2x^2+6x = 4x+4$

$2x^2+2x-4 = 0$

$2(x^2+x-2) = 0$

$2(x+2)(x-1) = 0$

$x = -2, \cancel{1}$

1 is an extraneous soultion

5. $(x-1) \dfrac{x}{x+4} + \dfrac{7}{x-1} \cdot (x+4) = \dfrac{x+34}{x^2+3x-4}$

$(x-1)(x+4)$

$x^2-x+7x+28 = x+34$

$-x-34 \quad -x-34$

$x^2+5x-6 = 0$

$(x-1)(x+6) = 0$

$x \neq 1, 4$

$x = -6, \cancel{1}$

1 is an extraneous solution