Sec. 8.6 Solving Rational Equations

Practice

a. $\frac{5x}{4} - \frac{3}{x} = \frac{1}{4}$ LCD: $4x$

① $4x \cdot \frac{5x}{4} - 4x \cdot \frac{3}{x} = 4x \cdot \frac{1}{4}$

$5x^2 - 12 = x$

$-x \quad -x$

$5x^2 - x - 12 = 0$

$x = \frac{1 \pm \sqrt{1 - 4 \cdot 5(-12)}}{2(5)}$ (+240)

$x = \frac{1 \pm \sqrt{241}}{10}$

② $\frac{5x \cdot x}{4x} - \frac{3 \cdot 4}{4x} = \frac{1x}{4x}$

$5x^2 - 12 = x$

b. $\frac{7x+3}{x^2-8x+15} + \frac{3x}{x-5} = \frac{1}{3-x}$

$-1(x-3)(x-5) \quad -1(x-5)(x-3) \quad -1(x-3)(x-5)$

D: $x \neq 3, 5$ LCD: $-1(x-3)(x-5)$

① $\frac{(7x+3)(-1)(x-3)(x-5)}{(x-3)(x-5)} + \frac{(3x)(-1)(x-3)(x-5)}{(x-5)}$

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

$-1(7x+3) + (-3x)(x-3) = 1(x-5)$

$-7x - 3 - 3x^2 + 9x = x - 5$

$+5 \quad -x \quad -x+5$

$\frac{-3x^2}{-1} + \frac{x}{-1} + \frac{2}{-1} = \frac{0}{-1}$

$3x^2 - x - 2 = 0$

$(3x+2)(x-1) = 0$

$x = -\frac{2}{3}, 1$

$\frac{-1(7x+3)}{x^2-8x+15} + \frac{-1(3x)(x-3)}{x-5} = \frac{1(x-5)}{3-x}$

$-1(x-3)(x-5) \quad -1(x-5)(x-3) \quad -1(x-3)(x-5)$

$-1(7x+3) - 3x(x-3) = x - 5$

c. $\frac{10(y-4)}{2y+8} - \frac{2(7y+8)}{y^2-16} = \frac{-8(y+4)}{2y-8}$

$2(y+4)(y-4)$ $2(y+4)(y-4)$ $2(y-4)(y+4)$

D: $y \neq 4, -4$

$10(y-4) - 2(7y+8) = -8(y+4)$

$10y - 40 - 14y - 16 = -8y - 32$

$-4y - 56 = -8y - 32$

$+8y \quad +56 \quad +8y \quad +56$

$\frac{4y}{4} = \frac{24}{4}$

$y = 6$

d. $\frac{-1(5)}{x^2-7x+12} - \frac{2(x-4)}{3-x} = \frac{5(-1)(x-3)}{x-4}$

D: $x \neq 3, 4$

$-1(x-3)(x-4)$ $-1(x-3)$ $(x-4)$

$-5 - 2(x-4) = -5(x-3)$

$-5 - 2x + 8 = -5x + 15$

$+5 \quad +5x \quad -8 \quad +5x \quad -3$

$3x = 12$

$x = 4$ no solution

Review 8.4, 8.5

8.4

Simplify:

a. $\frac{x^2-5x-24}{x^2-7x-30} = \frac{(x-8)(x+3)}{(x+3)(x-10)}$

1:30
2:15
3:10

hole: $x+3$; V.A.: $x-10$

$\frac{x-8}{x-10}, x \neq -3, 10$

b. $\frac{x^2+3x-10}{x^2+4x-12} \cdot \frac{3x+18}{x+3}$

1:10
2:55

$\frac{(x-2)(x+5)(3)(x+6)}{(x-2)(x+6)(x+3)}$

H: $x-2$; H: $x+6$; V.A.: $x+3$

$\frac{3(x+5)}{(x+3)}, x \neq 2, -6, -3$

c. $\frac{x^2-7x+10}{x^2-8x+15} \div \frac{4-x^2}{x^2+3x-18}$

$\rightarrow \frac{(x^2-7x+10)}{(x^2-8x+15)} \cdot \frac{(x^2+3x-18)}{(4-x^2)}$

$\frac{(x-2)(x-5)(x+6)(x-3)}{(x-3)(x-5)(2+x)(2-x)}$

h: $x-3$; h: $x-5$; V.A.: $x+2$; (-1); h: $x-2$

$\frac{(x+6)}{-1(x+2)}, x \neq 3, 5, -2, 2, -6$

$-\frac{x+6}{x+2}$

8.5 Practice

Find the LCM / LCD.

a. $x^2+3x-10$ and $2x+10$

$2(x+5)(x-2)$ $\quad 2(x+5)(x-2)$

$2(x+5)(x-2)$

Simplify

a. $\dfrac{x\cdot x}{3x+9} - \dfrac{3\cdot 8}{x^2+3x} = \dfrac{x^2-24}{3x(x+3)}$

$3(x+3)x$ $\quad 3x(x+3)$ $\quad x\neq 0,-3$

b. $\dfrac{x(x-2)}{x+3} + \dfrac{7x+6}{x^2+x-6}$

$(x+3)(x-2)$ $\quad (x+3)(x-2)$

$\dfrac{x^2-2x+7x+6}{(x+3)(x-2)}$

$\dfrac{x^2+5x+6}{(x+3)(x-2)}$ $\quad (x+2)(x+3)$

$\dfrac{(x+3)(x-2)}{(x+3)(x-2)}$, $x\neq -3, 2$

$\dfrac{x+2}{x-2}$, $x\neq -3, 2$

Sec. 8.6 Solving Rational Equations

Solve

a. $4x\left(\frac{5x\cdot x}{4x}-\frac{4\cdot 3}{4x}=\frac{1\cdot x}{4x}\right)$

$5x^2-12=x$

$-x \quad -x$

$5x^2-x-12=0$

$x=\frac{1\pm\sqrt{1-4(5)(-12)}}{2\cdot 5}$

$x=\frac{1\pm\sqrt{241}}{10}$

b. $\frac{-1(7x+3)}{x^2-8x+15}+\frac{-1(3x)(x-3)}{x-5}=\frac{1(x-5)}{3-x}$

$-1(x-3)(x-5) \quad -1(x-5)(x-3) \quad -1(x-3)(x-5)$

D: $x\neq 3,5$ $-3x$

$-1(7x+3)+(-1)(3x)(x-3)=x-5$

$-7x-3-3x^2+9x=x-5$

$+5 \quad -x \quad -x+5$

$\frac{-3x^2}{-1}+\frac{x}{-1}+\frac{2}{-1}=\frac{0}{-1}$

$3x-x-2=0$

$(3x+2)(x-1)=0$

$x=-\frac{2}{3},\ 1$