

Do Now - Simplifying Complex Fractions

identify the LCD
for all the
"sub-denominators"

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

multiply numerator
and denominator
by "giant 1" LCD

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

continue to simplify,
factor and reduce
if possible

$$\frac{30x^2 + 18x}{3x + 4} \cdot \frac{6x^2}{6x^2}$$

$$\frac{6x(5x + 3)}{3x + 4}$$

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

$$\frac{\frac{x}{y^2} + \frac{3}{x} \cdot \frac{xy^2}{xy^2}}{\frac{4x}{y} \cdot \frac{1}{xy^2}}$$

$$\frac{x^2 + 3y^2}{4x^2y}$$

Solving Rational Equations

$$\frac{12}{1} \cdot \left(\frac{2x}{3} + \frac{5x}{4} \right) = \left(\frac{7}{6} \right) \cdot \frac{12}{1}$$

$$8x + 15x = 14$$

$$23x = 14$$

$$x = \frac{14}{23}$$

$$\frac{(x+3)(x-1)}{1} \cdot \left(\frac{x}{x+3} \right) = \left(\frac{6}{x-1} \right) \cdot \frac{(x+3)(x-1)}{1}$$

$$x(x-1) = 6(x+3)$$

$$x^2 - x = 6x + 18$$

$$x^2 - 7x - 18 = 0$$

$$(x+2)(x-9) = 0$$

$$x = -2, 9$$

check solutions in original equation

$$\frac{-2}{-2+3} = \frac{6}{-2-1}$$

$$\frac{-2}{1} = \frac{6}{-3}$$

$$-2 = -2$$

$$\frac{9}{9+3} = \frac{6}{9-1}$$

$$\frac{9}{12} = \frac{6}{8}$$

$$\frac{3}{4} = \frac{3}{4}$$

$$\frac{x}{x+2} - \frac{8}{x^2-4} = \frac{2}{x-2}$$

$$\frac{(x+2)(x-2)}{1} \cdot \left(\frac{x}{x+2} - \frac{8}{(x+2)(x-2)} \right) = \left(\frac{2}{x-2} \right) \cdot \frac{(x+2)(x-2)}{1}$$

$$x(x-2) - 8 = 2(x+2)$$

$$x^2 - 2x - 8 = 2x + 4$$

$$x^2 - 4x - 12 = 0$$

$$(x+2)(x-6) = 0$$

$$x \neq -2, x = 6$$

$$\frac{-2}{-2+2} - \frac{8}{(-2)^2-4} = \frac{2}{-2-2}$$

$$\frac{-2}{0} - \frac{8}{0} = \frac{2}{-4}$$

undefined

$$\frac{6}{6+2} - \frac{8}{(6)^2-4} = \frac{2}{6-2}$$

$$\frac{6}{8} - \frac{8}{32} = \frac{2}{4}$$

$$\frac{3}{4} - \frac{1}{4} = \frac{2}{4}$$

$$\frac{1}{2} = \frac{1}{2}$$

Solving Rational Inequalities

$$\frac{x}{2x-1} \leq 1$$

$$\frac{x}{2x-1} - 1 \leq 0$$

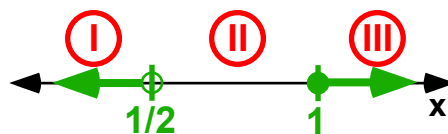
$$\frac{x}{2x-1} - 1 \cdot \frac{2x-1}{2x-1} \leq 0$$

$$\frac{x - (2x-1)}{2x-1} \leq 0$$

$$\frac{x - 2x + 1}{2x-1} \leq 0$$

$$\frac{-x + 1}{2x-1} \leq 0$$

VA: $x = \frac{1}{2}$; x-int: (1,0)



$$x < \frac{1}{2} \text{ or } x \geq 1$$

Ⓘ test $x = 0$

$$\frac{0}{2(0)-1} \leq 1$$

$$\frac{0}{-1} \leq 1$$

$$0 \leq 1$$

true

Ⓜ test $x = 3/4$

$$\frac{3}{4} \leq 1$$

$$\frac{3}{2\left(\frac{3}{4}\right)-1} \leq 1$$

$$\frac{3}{\frac{1}{2}} \leq 1$$

$$\frac{3}{2} \leq 1$$

false

Ⓝ test $x = 2$

$$\frac{2}{2(2)-1} \leq 1$$

$$\frac{2}{3} \leq 1$$

true

$$\frac{4(x-1)}{x+1} < 2$$

$$\frac{4x-4}{x+1} - 2 < 0$$

$$\frac{4x-4}{x+1} - 2 \cdot \frac{x+1}{x+1} < 0$$

$$\frac{4x-4-2(x+1)}{x+1} < 0$$

$$\frac{4x-4-2x-2}{x+1} < 0$$

$$\frac{2x-6}{x+1} < 0$$

$$\frac{2(x-3)}{x+1} < 0$$

VA: $x = -1$; x-int: (3,0)



$$-1 < x < 3$$

Ⓘ test $x = -2$

$$\frac{4(-2-1)}{-2+1} < 2$$

$$\frac{-12}{-1} < 2$$

$$12 < 2$$

false

Ⓜ test $x = 0$

$$\frac{4(0-1)}{0+1} < 2$$

$$\frac{-4}{1} < 2$$

$$-4 < 2$$

true

Ⓝ test $x = 4$

$$\frac{4(4-1)}{4+1} < 2$$

$$\frac{12}{5} < 2$$

$$\frac{12}{5} < \frac{10}{5}$$

false