

7.10 NOTES - FRACTIONAL EQUATIONS

OBJECTIVES:

- 1) Solve fractional equations and discard extraneous solutions.

Understanding the concept:

Solve for x: $\frac{1}{4} + \frac{x}{4} = \frac{3}{4}$ $1+x=3$ $x=2$

SOLVING FRACTIONAL EQUATIONS

- 1.) Factor everything possible.
- 2.) Write the domain of each equation.
- 3.) Find the LCD (least common denominator) and multiply **BOTH** sides by the LCD.
- 4.) Distribute, simplify and solve.
- 5.) Throw out any **EXTRANEIOUS SOLUTIONS** that make the original denominators zero.

GOAL: GET RID OF THE DENOMINATOR!

1.) $\frac{3x-2}{x+3} + \frac{2x-3}{x+3} = \frac{x+11}{x+3}$ D: $\mathbb{R} \ x \neq -3$

$$3x-2+2x-3 = x+11$$

$$5x-5 = x+11$$

$$4x = 16$$

$$x = 4$$

2.) $\frac{2}{x+3} = \frac{4}{x-2}$ $x \neq 2, -3$

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

$$2x-4 = 4x+12$$

$$2x = -16$$

$$x = -8$$

3.) $\frac{x-3}{x} = \frac{4}{3} + \frac{2}{x}$ $x \neq 0$

$$3(x-3) = 4x+6$$

$$3x-9 = 4x+6$$

$$x = -15$$

4.) $\frac{2x+3}{4x^2} = \frac{3}{2x}$ $x \neq 0$

$$2x(2x+3) = 3(4x^2)$$

$$4x^2 + 6x = 12x^2$$

$$8x^2 = 6x$$

$$8x^2 - 6x = 0$$

$$2x(4x-3) = 0$$

$$x \neq 0 \quad x = \frac{4}{3}$$

EXAMPLES

$$5.) \frac{3}{x-3} + \frac{4}{x-4} = \frac{25}{x^2-7x+12} \quad x \neq 4, 3$$

$$\frac{3}{x-3} + \frac{4}{x-4} = \frac{25}{(x-4)(x-3)}$$

$$3(x-4) + 4(x-3) = 25$$

$$3x-12+4x-12=25$$

$$7x-24=25$$

$$7x=49$$

$$\boxed{x=7}$$

$$6.) \frac{2}{x-4} = \frac{1}{x+4} - \frac{3}{x^2-16} \quad x \neq 4, -4$$

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

$$2x+8 = x-7$$

$$\boxed{x=-15}$$

$$7.) \frac{3}{x^2-5x+6} = \frac{3}{x-3} + 2 \quad x \neq 3, 2$$

$$(x-2)(x-3)$$

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

$$3 = 3x-6 + 2(x^2-5x+6)$$

$$3 = 3x-6+2x^2-10x+12$$

$$0 = 2x^2-7x+3$$

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

$$\boxed{x=\frac{1}{2}} \quad x=3$$

$$8.) \frac{4x}{x-1} - \frac{5x}{x-2} = \frac{2}{x^2-3x+2} \quad x \neq 2, 1$$

$$4x(x-2) - 5x(x-1) = 2$$

$$4x^2-8x-5x^2+5x=2$$

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

$$x^2+3x+2=0$$

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

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