## PC11 Lesson 6.4

Wednesday, April 26, 2017 4:41 PM

## 6.4 Rational Equations

To solve equations with rational expressions:

- 1. factor if possible
- 2. Identify NPV of the variables
- 3. Multiply both sides of the equation by common denominator
- 4. Solve for the variables.
- Check your answer.

LCD: X2 NPV: X \$0 LCD:5x  $\chi^2 = 10 + \chi(\chi + 3)$  $\chi^{2} = 10 + \chi^{2} + 3\chi$  $0 = \chi^2 - \chi^2 + 3\chi + 10$ 0 = 32+10 -10 = 3x check  $\frac{-10}{3} \div 5 = \frac{2}{(-1\%_3)} \div \frac{-1\%_3 + 3}{5}$  $-\frac{10}{15} = \frac{6}{-10} - \frac{1}{15}$ - 10 = -10 15

Chapter 6 Ration Expressions and Equations

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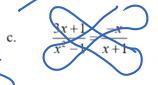
a. 
$$\frac{5}{x-2} = \frac{9}{3x-6}$$

NPV: X = 2

$$\frac{5}{x-1} = \frac{9}{3(x-2)}$$

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

: No Soln



NPV

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

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

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

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

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

x=-1 .: No So 12

Example 3: Solve each equation:

a. 
$$\frac{x}{x-3} = \frac{-6}{x^2 - 8x + 15}$$

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

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

$$\chi(\chi-5) = -6$$

$$x \neq 3,5$$
 (x-2)(x-3) = 0

b. 
$$\frac{x}{x+1} - \frac{x+1}{x-4} = \frac{5}{x^2 - 3x - 4}$$

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

$$\frac{\chi(\chi-4) - (\chi+1)(\chi+1)}{(\chi+1)(\chi-4)} = \frac{5}{(\chi+1)(\chi-4)}$$

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

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

$$\chi^2 - 4\chi - \chi^2 - 2\chi - 1 = 5$$

$$-6x-1=5$$

$$-6x = 6$$

$$x = -1$$

-: No Sola

Rational equations can be used to solve a variety of real-world problems, including those involving motion, work, and proportions.

Example 1: A boat travels at an average speed of 15 km/h in still water. The boat travels 12 km downstream in the same time as it travels 8 km upstream. Determine the average speed of the current.

	Distance	Speed	Time
Downstream	12	15 +2	12 15+x
Upstream	8	15 -x	8

$$\frac{12}{15+x}(15-x)\left(\frac{12}{15+x}\right) = \left(\frac{8}{15-x}\right)(15+x)(15-x)$$

$$\frac{13(15+x)(15-x)}{15+x} = \frac{8(15+x)(15-x)}{15-x}$$

$$13(15-x) = 8(15+x)$$

$$180-12x = 120+8x$$

$$60 = 20x$$

$$3 = x$$

The average speed of the current is 3km/h.

Example 2: Kyra mows a lawn in 40 min. When Mark and Kyra work together, they can mow the lawn in 24 min. How long would it take Mark to mow the lawn on his own?

Let x = time it took Mark by himself.

	Time	Fraction of work done in 1 min.	Fraction of work done in 24 min.
Kyra	40	40	24 × 1 = 24 40
Mark	X	1	<u>24</u>
Together	24	24	24 - 1
			24 - 1

$$\frac{40^{2}}{40} + \frac{24}{x} = (1) 40^{2}$$
on his own
$$\frac{24}{40} + \frac{960^{2}}{x} = 40^{2}$$

$$\frac{24}{40} + 960 = 16^{2}$$

**Example 3:** How much lemon juice must be added to 2 L of water to make a lemonade solution that contain 20% lemon juice?