Solving Rational Equations

Strategies:

- (1) Factor numerators and denominators, looking for any common factors to remove. (note: removed factors are restrictions on solution)
- (2) Combine separate fractions using a lowest common denominator.
- (3) Rearrange so one side is zero and the other has a common denominator, then solve the numerator only.

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Ex.1 Solve
$$\frac{x^2 - x - 6}{x^2 + x - 12} = 0$$

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

$$\times (x-4) \qquad \frac{x+2}{x+4} = 0 \quad x \neq 3$$

$$x+2 = 0 \quad x \neq 3 \quad x \neq 4$$

$$x = -2$$

Ex.2 Solve
$$\frac{x+3}{x-4} = \frac{x-1}{x+2}$$

$$\frac{x+3}{x-4} - \frac{x-1}{x+2} = 0$$

$$\frac{(x+3)(x+2) - (x-1)(x-4)}{(x-4)(x+2)} = 0$$

$$\frac{(x+3)(x+2) - (x-1)(x-4)}{(x-4)(x+2)} = 0$$

$$\frac{(x^2 + 5x + 6) - (x^2 - 5x + 4)}{(x-4)(x+2)} = 0$$

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

$$\frac{2(5x+1)}{(x-4)(x+2)} = 0$$

$$\frac{2(5x+1)}{x} = 0$$

$$\frac{2(5x+1)}{x} = 0$$

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Ex.3 Solve
$$\frac{1}{x} + \frac{1}{x-3} = \frac{1}{2}$$

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

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

$$\frac{2x-6+2x-x^2+3x}{2x(x-3)} = 0$$

$$\frac{-x^2+7x-6}{2x(x-3)} = 0$$

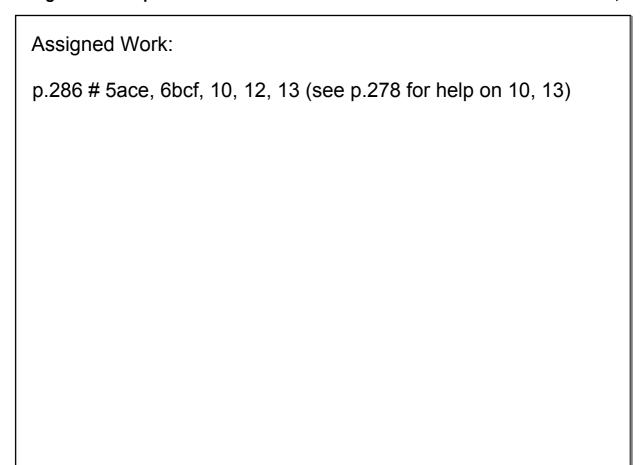
$$\frac{x^2-7x+6}{2x(x-3)} = 0$$

$$\frac{(x-1)(x-6)}{2x(x-3)} = 0$$

$$\frac{(x-1)(x-6)=0}{2x(x-3)} = 0$$

$$\frac{(x-1)(x-6)=0}{2x(x-3)} = 0$$

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