Solving Rational Equations

When we multiply or divide an equation by an expression containing variables, the resulting equation may have solutions that are *not* solutions of the original equation. These are **extraneous solutions**. For this reason we must check each solution of the resulting equation in the original equation.

EXAMPLE 1 Solving by Clearing Fractions

Solve
$$\frac{x}{7} + \frac{3}{x} = 4$$
.

Multiply both sides by LCD

 $\frac{x}{7} + \frac{3}{x} = 4$.

 $\frac{x}{7} + \frac{3}{3} = 4$.

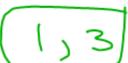
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EXAMPLE 1 Solving by Clearing Fractions

Solve
$$x + \frac{3}{x} = 4$$
.

 $1 + \frac{3}{7} = 4$
 $3 + \frac{3}{3} = 4$









EXAMPLE 2 Solving a Rational Equation

Solve
$$x + \frac{1}{x - 4} = 0$$
.

LCO = $x - 4$

(x-4) • $x + (x - 4) = (x - 4) = 0$

2+53

 $x = (x - 4) + 1 = 0$
 $x = 4 + 5 = 0$
 $x = 4 + 3 = 2 + 5 =$

EXAMPLE 3 Eliminating Extraneous Solutions

Solve the equation

$$\frac{2x}{x-1} + \frac{1}{(x-3)^2} = \frac{2}{x^2 - 4x + 3}.$$
(\times -3 \)\(\times -3 \)\(\times -1)

$$(X-1)(X-3) \cdot \frac{2X}{(X-1)} + (X-1)(X-3) \cdot \frac{1}{(X-3)} = \frac{(X-1)(X-3)}{X^2-4X+3}$$

$$2x^2 - 6x + x - 1 = 2$$

$$2x^{2}-5x-3=0$$

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

EXAMPLE 4 Eliminating Extraneous Solutions

Solve

$$x = 3$$

$$x = 3$$

$$x = 2$$

$$x = 2$$

$$x = 3$$

$$x = 2$$

$$x = 3$$

$$x = 4$$

$$x =$$

NO Solution