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

Multiply both sides by LOD, x

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

$$x + \frac$$

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

EXAMPLE 2 Solving a Rational Equation

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

LCD $\Rightarrow x - 4$
 $(x - 4) \cdot x + (x - 4) \cdot 1 = (x - 4) \cdot 0$
 $x^2 - 4x + 1 = 0$
 $4 + \sqrt{16 - 4} = 4 + \sqrt{12}$
 $4 + \sqrt{16} = 4 + \sqrt{12}$

EXAMPLE 3 Eliminating Extraneous Solutions

Solve the equation

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

$$(X-3)(X-1).2X + (X-3)(X-1).1 = (X-3)(X-1).2$$

 $(X-3)(X-1).2$

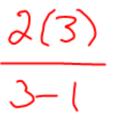
$$2X(X-3) + (X-1) = 2$$

 $2x^{2} - 6x + X-1 = 2$
 $2x^{2} - 5x - 3 = 0$
 $(2x + 1)(x - 3) = 0$

EXAMPLE 3 Eliminating Extraneous Solutions

Solve the equation

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









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







Eliminating Extraneous Solutions

Solve

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

$$(X+2)(X-3) + 3X + 6 = 0$$

$$x^{2}-x-4+3x+6=0$$

$$x^{2} + 2x = 0$$

NO x(x+2) = 0

$$X(X+2) = C$$

