

**EXAMPLE 2** Multiply by the LCDSolve  $\frac{x}{x-2} + \frac{1}{5} = \frac{2}{x-2}$ . Check your solution.

$$\frac{x}{x-2} + \frac{1}{5} = \frac{2}{x-2}$$

Write original equation.

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

Multiply by LCD,  $5(x-2)$ .

$$\frac{x \cdot 5(x-2)}{x-2} + \frac{5(x-2)}{5} = \frac{2 \cdot 5(x-2)}{x-2}$$

Multiply and divide out common factors.

$$5x + x - 2 = 10$$

Simplify.

$$6x - 2 = 10$$

Combine like terms.

$$6x = 12$$

Add 2 to each side.

$$x = 2$$

Divide each side by 6.

**AVOID ERRORS**

Be sure to identify the excluded values for the rational expressions in the original equation.

The solution appears to be 2, but the expressions  $\frac{x}{x-2}$  and  $\frac{2}{x-2}$  are undefined when  $x = 2$ . So, 2 is an extraneous solution.

► There is no solution.

**EXAMPLE 3** Factor to find the LCDSolve  $\frac{3}{x-7} + 1 = \frac{8}{x^2 - 9x + 14}$ . Check your solution.**Solution**Write each denominator in factored form. The LCD is  $(x-2)(x-7)$ .

$$\frac{3}{x-7} + 1 = \frac{8}{(x-2)(x-7)}$$

$$\frac{3}{x-7} \cdot (x-2)(x-7) + 1 \cdot (x-2)(x-7) = \frac{8}{(x-2)(x-7)} \cdot (x-2)(x-7)$$

$$\frac{3(x-2)(x-7)}{x-7} + (x-2)(x-7) = \frac{8(x-2)(x-7)}{(x-2)(x-7)}$$

$$3(x-2) + (x^2 - 9x + 14) = 8$$

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

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

$$x(x-6) = 0$$

$$x = 0 \text{ or } x - 6 = 0$$

$$x = 0 \text{ or } x = 6$$

► The solutions are 0 and 6.

**CHECK**If  $x = 0$ :

$$\frac{3}{0-7} + 1 \stackrel{?}{=} \frac{8}{0^2 - 9 \cdot 0 + 14}$$

$$\frac{4}{7} = \frac{4}{7} \checkmark$$

If  $x = 6$ :

$$\frac{3}{6-7} + 1 \stackrel{?}{=} \frac{8}{6^2 - 9 \cdot 6 + 14}$$

$$-2 = -2 \checkmark$$