Objectives

- Determine the domain of the variable in a rational equation.
- Solve rational equations.
- Recognize the graph of a rational function.

7.4 Equations with Rational Expressions and Graphs

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Expression vs. Equation

- What is the difference between an **expression** and an **equation?**

Domain

Find the domain of the variable in each equation.

$$\frac{1}{3x} - \frac{3}{4x} = \frac{1}{3}$$

$$\frac{1}{x-7} + \frac{2}{x+7} = \frac{14}{x^2-49}$$

Solving Equations with Rational Expressions

1

2

3

Example 1

Solve.

$$-\frac{3}{20} + \frac{2}{x} = \frac{5}{4x}$$

Example 2

Solve.

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

The "Wipe Out" Method

1

2

3

Example 3

Solve.

$$\frac{2}{p^2 - 2p} = \frac{3}{p^2 - p}$$

Example 4

Solve.

$$\frac{4}{x^2 + x - 6} - \frac{1}{x^2 - 4} = \frac{2}{x^2 + 5x + 6}$$

Example 5

Solve.

$$\frac{1}{x-2}+\frac{1}{5}=\frac{2}{5x^2-20}$$

continued

Example 6

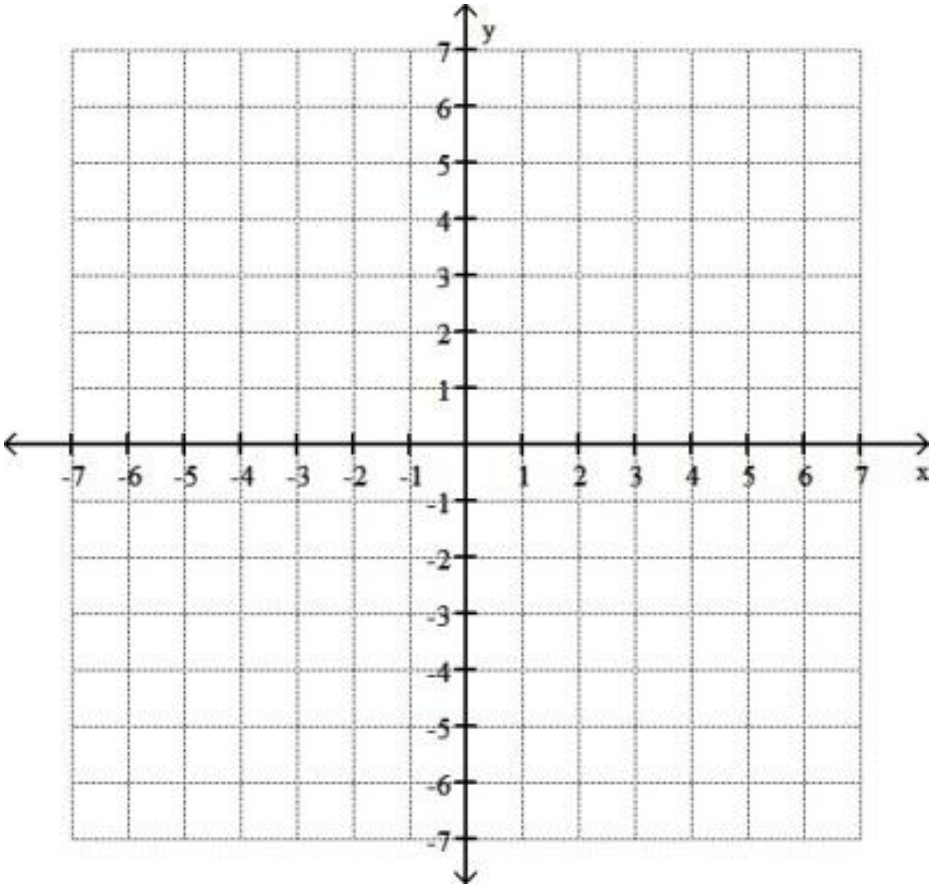
Solve.

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

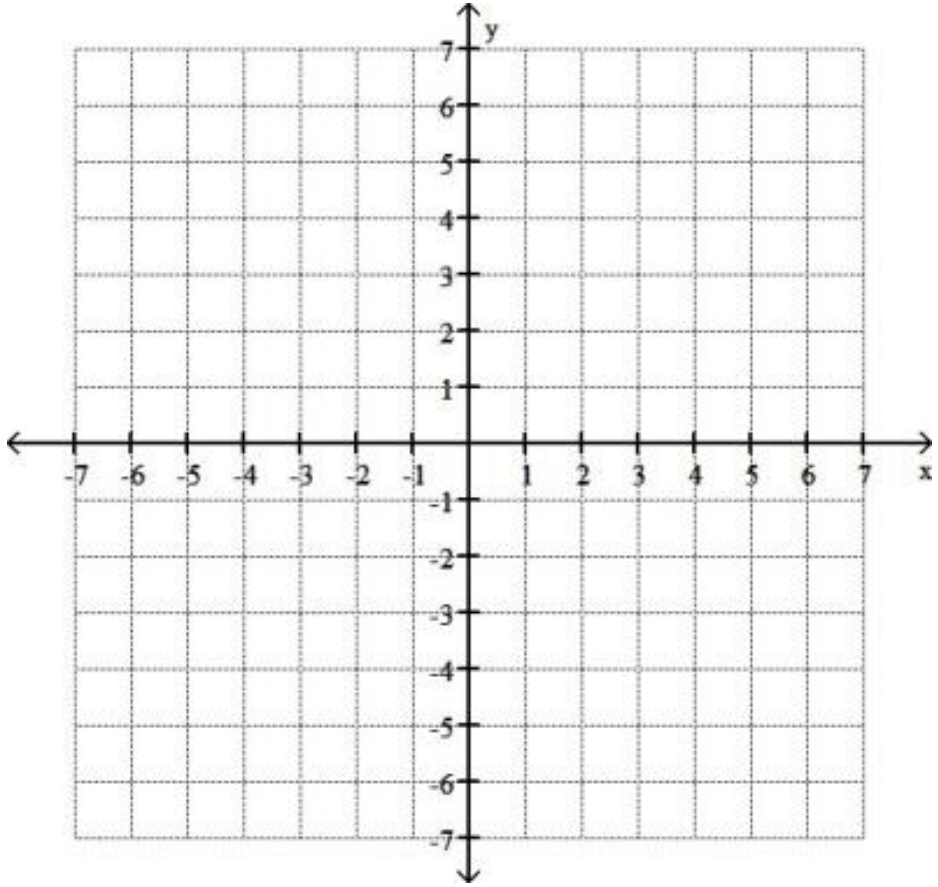
continued

Graphs of Rational Functions

$$f(x) = \frac{1}{x}$$



Graphs of Rational Functions



Example 7

Graph, and give the equations of the vertical and horizontal asymptotes.

$$f(x) = \frac{2}{x+3}$$