

Simplify. Identify any x-values for which the expression is undefined.

1.  $\frac{6x^3}{27x^2+12x}$

2.  $\frac{x^2-x-2}{3x-6}$

3.  $\frac{-x^2+16}{-x^2-9x-20}$

4.  $\frac{4xy^3}{5x^2} \cdot \frac{20x^3y^2}{-16xy^7}$

5.  $\frac{x^2-9}{2x+10} \cdot \frac{x+5}{x-3}$

6.  $\frac{x-4}{2x^2} \cdot \frac{x}{x^2-x-12}$

7.  $\frac{3x^3}{4x+4} \div \frac{9x}{x+1}$

8.  $\frac{12x^3y^6}{9xy} \div \frac{6y^2}{3x}$

9.  $\frac{x^2-16}{x^2+4x+3} \div \frac{x-4}{x+1}$

Add or Subtract. Identify any x-values for which the expression is undefined.

10.  $\frac{x+9}{2x+1} + \frac{3x+6}{2x+1}$

11.  $\frac{2}{x+3} + \frac{4x}{x^2-9}$

12.  $\frac{1}{x^2+6x+8} + \frac{1}{x^2-6x-16}$

13.  $\frac{x-6}{x+5} - \frac{8x+7}{x+5}$

14.  $\frac{x}{x+1} - \frac{3}{x+4}$

15.  $\frac{7}{x-9} - \frac{2x-6}{x^2-13x+36}$

Simplify.

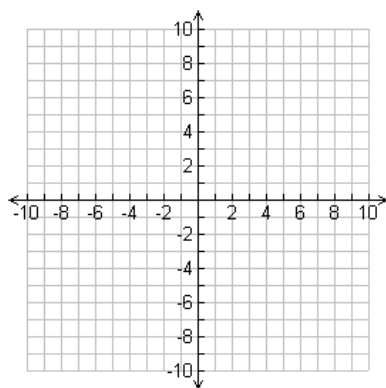
$$16. \frac{\frac{3x}{3x+21}}{\frac{9x^2}{x+7}}$$

$$17. \frac{\frac{x}{x-1}}{\frac{10x^2}{-4x+4}}$$

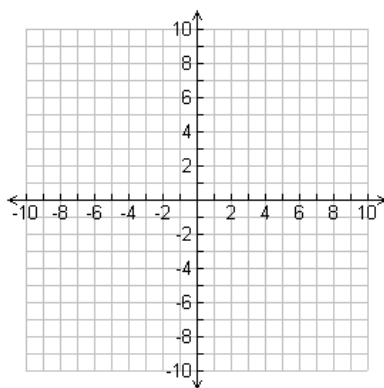
$$18. \frac{\frac{1}{x-2}}{\frac{x+3}{x^2-4}}$$

Using the graph of  $f(x) = \frac{1}{x}$  as a guide, describe the transformation and graph each function.

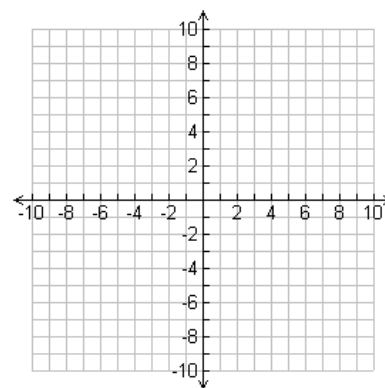
$$19. g(x) = \frac{1}{x-4}$$



$$20. g(x) = \frac{1}{x} + 6$$

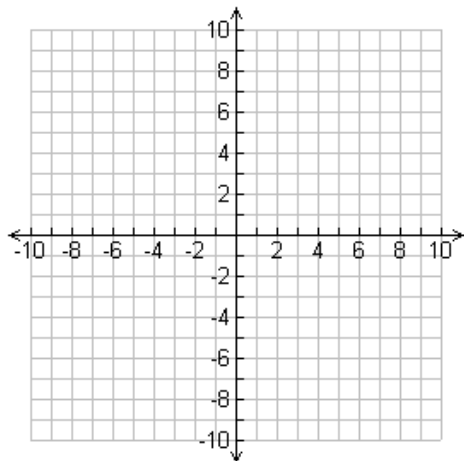


$$21. g(x) = \frac{1}{x+2} - 5$$

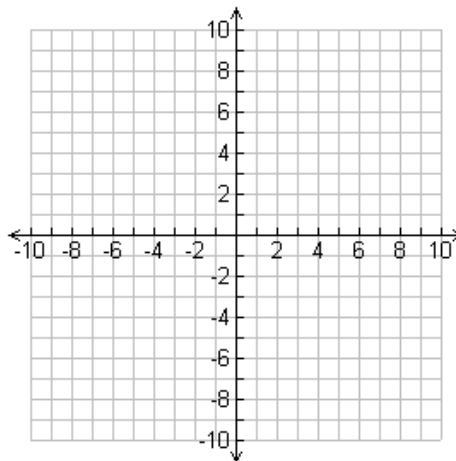


Graph each function. Identify any discontinuities and the end behavior

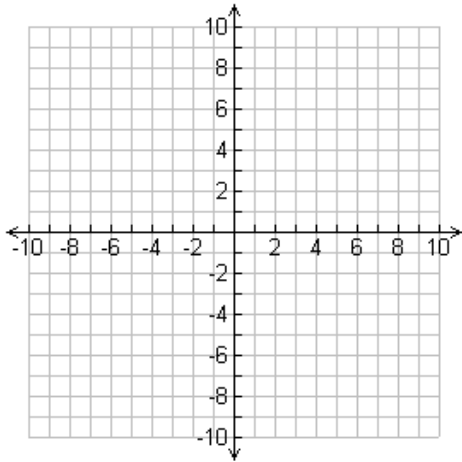
$$22. f(x) = \frac{x^2-5x-24}{2x+1}$$



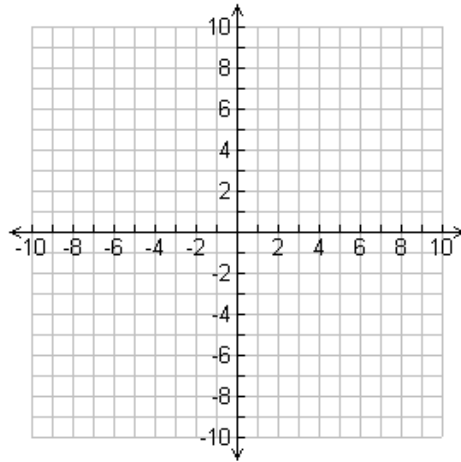
$$23. f(x) = \frac{2x^2-3x-2}{x-4}$$



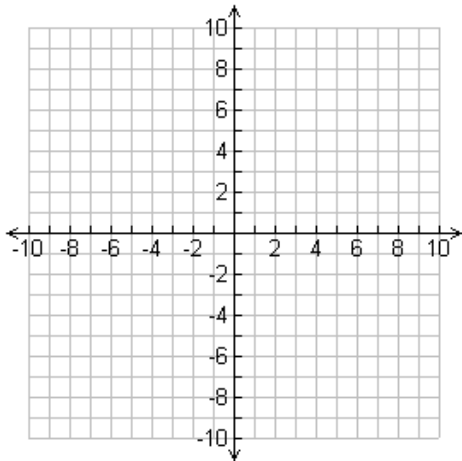
$$24. f(x) = \frac{-3x^2 + 8x - 4}{x^2 - 25}$$



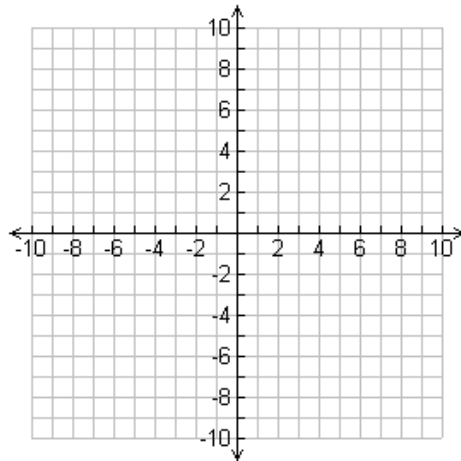
$$25. f(x) = \frac{x^2 - 4x - 21}{x + 3}$$



$$26. f(x) = \frac{x^2 - 4x - 5}{x^2 - 25}$$



$$27. f(x) = \frac{x^2 - 3x}{4x - 12}$$



Solve each equation.

$$28. 12 + \frac{2}{3x} = 6$$

$$29. x - \frac{1}{x} = \frac{35}{x}$$

$$30. \frac{x}{x+1} + \frac{x}{4} = \frac{3x}{4x+4}$$

$$31. \frac{x-1}{x-4} = \frac{x+6}{x}$$

$$32. \frac{6x}{x+5} = \frac{2x-20}{x+5}$$

$$33. \frac{4}{x-4} = -\frac{x}{x-4} + \frac{x}{2}$$

Solve each inequality

$$34. \frac{2x+1}{x} \geq 3$$

$$35. \frac{10}{x-2} < 2$$

$$36. \frac{15}{x+3} \leq 1$$