Rational Functions Assignment

Find the domain, vertical asymptotes and x-intercepts of each rational function given.

1. $f(x) = \frac{x^2-4}{x^2-9}$

2. $f(x) = \frac{(x+2)(x-3)}{(x+4)(x-5)}$

3. $f(x) = \frac{x^2+9x+20}{x^4}$

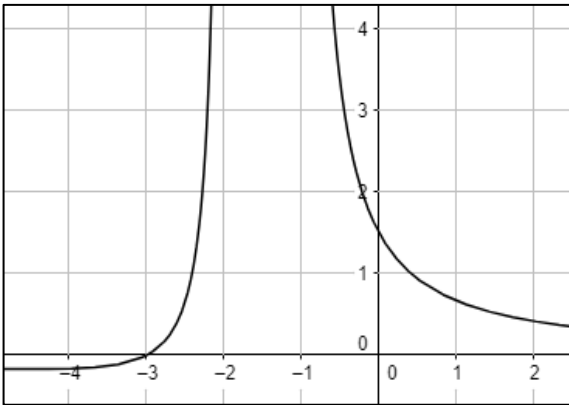**4.** $f(x) = \frac{(x-1)(x+1)}{(x+4)^2(x-2)^2}$

5. $f(x) = \frac{x^2-1}{x^3}$
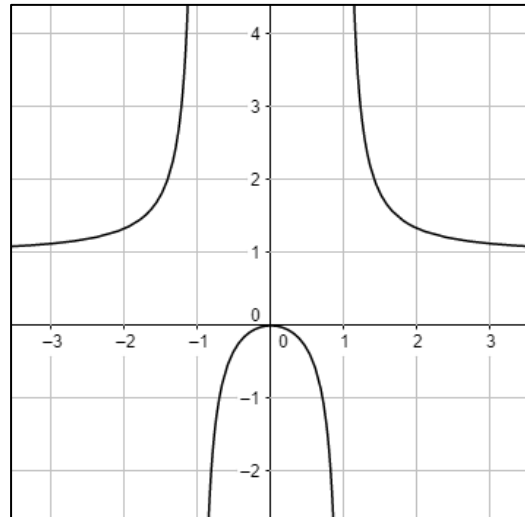
6. $f(x) = \frac{5}{(x-2)(x+1)}$

Rational Functions Assignment

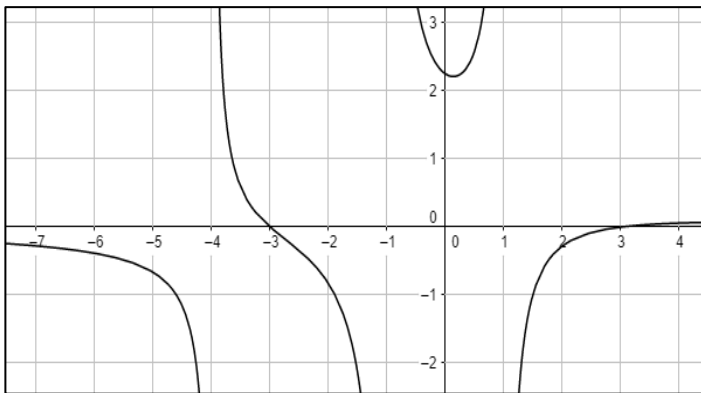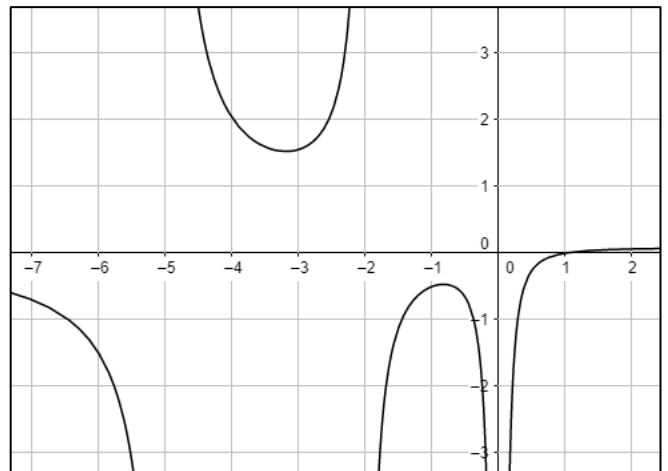**For the graphs given below, find the x-intercepts and vertical asymptotes (if any).**

1.

2.

3.

4.

Rational Functions Assignment

Solve each equation.

1. $\dfrac{x-1}{2x-4} + \dfrac{x+2}{3x} = 1$

2. $\dfrac{4}{x-2} - \dfrac{2}{x} = \dfrac{14}{x^2-2x}$

Rational Functions Assignment

Find the domain, vertical asymptotes and x-intercepts of each rational function given.

1. $f(x) = \frac{x^2-4}{x^2-9}$

Denominator has roots $x = 3$, $x = -3$.

Numerator has roots $x = 2$, $x = -2$.

Domain: $R - \{3, -3\}$

Vertical Asymptotes: $x = 3, x = -3$

x-intercepts: $x = 2, x = -2$

2. $f(x) = \frac{(x+2)(x-3)}{(x+4)(x-5)}$

Denominator has roots $x = -4$, $x = 5$.

Numerator has roots $x = -2$, $x = 3$.

Domain: $R - \{-4, 5\}$

Vertical Asymptotes: $x = -4, x = 5$

x-intercepts: $x = -2, x = 3$

3. $f(x) = \frac{x^2+9x+20}{x^4}$

Denominator has roots $x = 0$.

Numerator has roots:
$x^2 + 9x + 20 = (x+4)(x+5)$

Domain: $R - \{0\}$

Vertical Asymptotes: $x = 0$

x-intercepts: $x = -4, x = -5$

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

Denominator has roots $x = -4$, $x = 2$.

Numerator has roots $x = 1$, $x = -1$.

Domain: $R - \{-4, 2\}$

Vertical Asymptotes: $x = -4, x = 2$

x-intercepts: $x = 1, x = -1$

5. $f(x) = \frac{x^2-1}{x^3}$

Denominator has roots $x = 0$.

Numerator has roots: $x = 1, x = -1$
Domain: $R - \{0\}$

Vertical Asymptotes: $x = 0$

x-intercepts: $x = 1, x = -1$

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

Denominator has roots $x = 2$, $x = -1$.

Numerator has no roots.
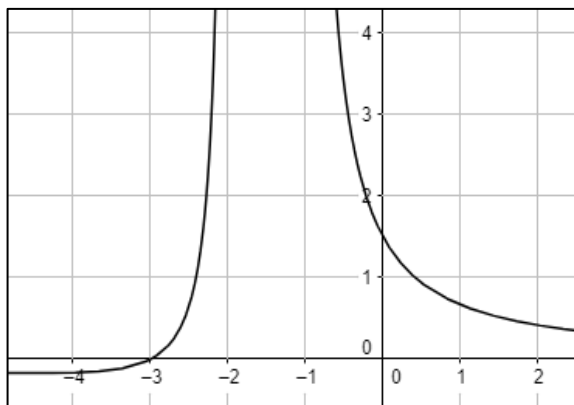
Domain: $R - \{2, -1\}$

Vertical Asymptotes: $x = -2, x = -1$

x-intercepts: None

Rational Functions Assignment

For the graphs given below, find the x-intercepts and vertical asymptotes (if any).
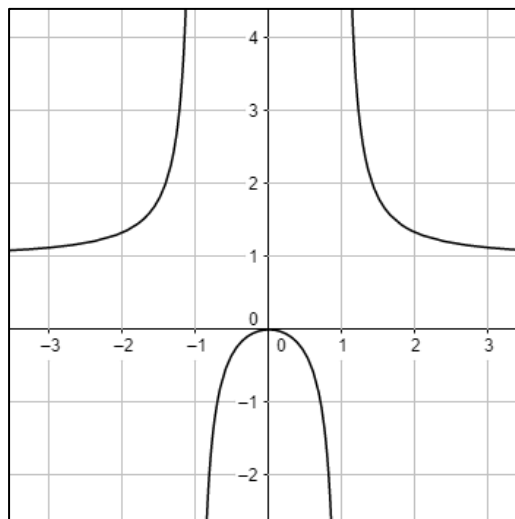
1.

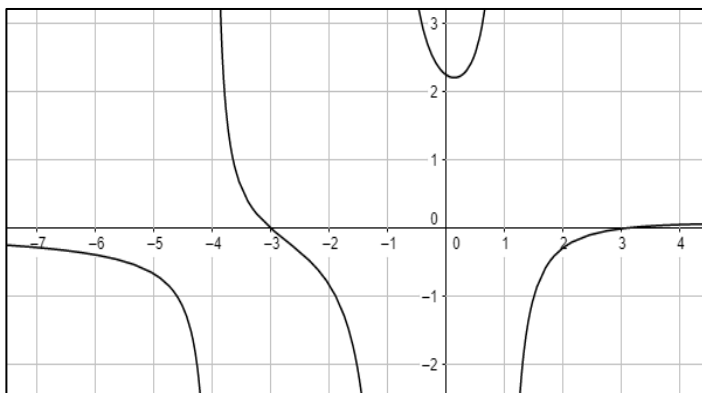**x-intercepts:** $x = -3$

vertical asymptotes: $x = -2, x = -1$

2.

x-intercepts: $x = 0$

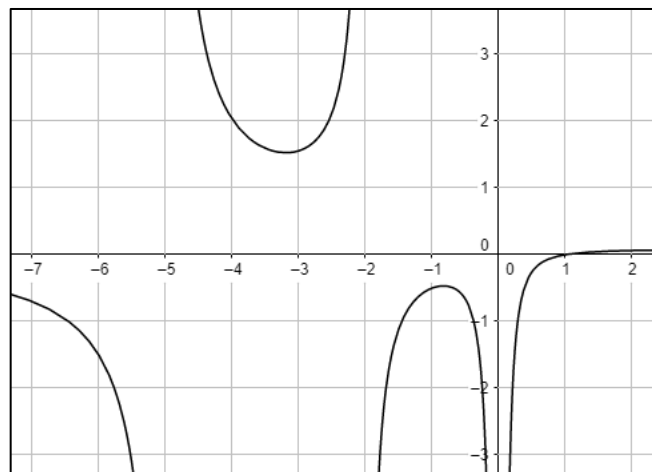**vertical asymptotes:** $x = -1, x = 1$

3.

x-intercepts: $x = -3, x = 3$

vertical asymptotes: $x = -4, x = -1, x = 1$

4.

x-intercepts: $x = 1$

vertical asymptotes: $x = -5, x = -2, x = 0$

Rational Functions Assignment

Solve each equation.

1. $\dfrac{x-1}{2x-4} + \dfrac{x+2}{3x} = 1$

$$\left(\dfrac{x-1}{2x-4} + \dfrac{x+2}{3x}\right)(2x-4)(3x) = 1(2x-4)(3x)$$

$$(x-1)3x + (x+2)(2x-4) = 6x^2 - 12x$$

$$3x^2 - 3x + 2x^2 + 4x - 4x - 8 = 6x^2 - 12x$$

$$0 = 6x^2 - 5x^2 - 12 + 3x + 8$$

$$x^2 - 9x + 8 = 0$$

$$(x-8)(x-1) = 0$$

$x = 8, x = 1$

2. $\dfrac{4}{x-2} - \dfrac{2}{x} = \dfrac{14}{x^2-2x}$

$$x(x-2)\left(\dfrac{4}{x-2} - \dfrac{2}{x}\right) = x(x-2)\left(\dfrac{14}{x(x-2)}\right)$$

$$4x - 2(x-2) = 14$$

$$4x - 2x + 4 = 14$$

$$2x = 10$$

$x = 5$