

$$f(x) = \frac{x^3 - 9x}{3x^2 - 6x - 9}$$

Zeros:

y-intercepts:

Points of Discontinuity:

Hole:

Vertical Asymptote:

Horizontal Asymptote:

Domain:

Range:

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

Zeros:

$$x = 0, 4$$

y-intercepts:

$$y = 0$$

Points of Discontinuity:

$$x = 3, -1$$

Hole: None

Vertical Asymptote:

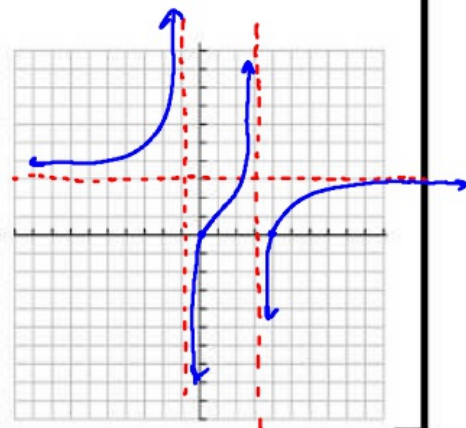
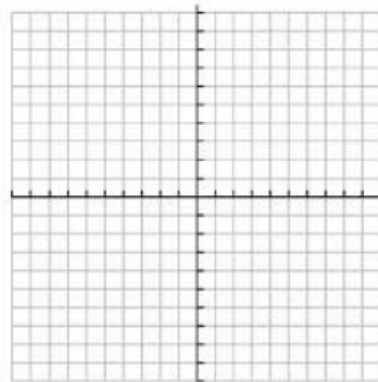
$$x = 3, -1$$

Horizontal Asymptote:

$$y = 3$$

Domain: $(-\infty, -1) \cup (-1, 3) \cup (3, \infty)$

Range: $(-\infty, \infty)$



$$-4x^2 + 4x + 24 = 0$$

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

$$(x-3)(x+2) = 0$$

Zeros:

$$x^2 - 16x = 0$$

$$x(x-16) = 0$$

$$x(x-4)(x+4) = 0$$

$$f(x) = \frac{x^3 - 16x}{-4x^2 + 4x + 24}$$

Zeros: $x = 0, -4, 4$

y-intercepts: $(0, 0)$

Points of Discontinuity: $x = 3, -2$

Hole: None

Vertical Asymptote: $x = 3, -2$

Horizontal Asymptote: None

Domain: $(-\infty, -2) \cup (-2, 3) \cup (3, \infty)$

Range:

$$f(x) = \frac{2x^2 + 10x + 12}{x^2 + 3x + 2} = \frac{2(x+3)(x+2)}{(x+2)(x+1)}$$

Zeros: $x = -3$

y-intercepts: $(0, 6)$

Points of Discontinuity: $x = -2, -1$

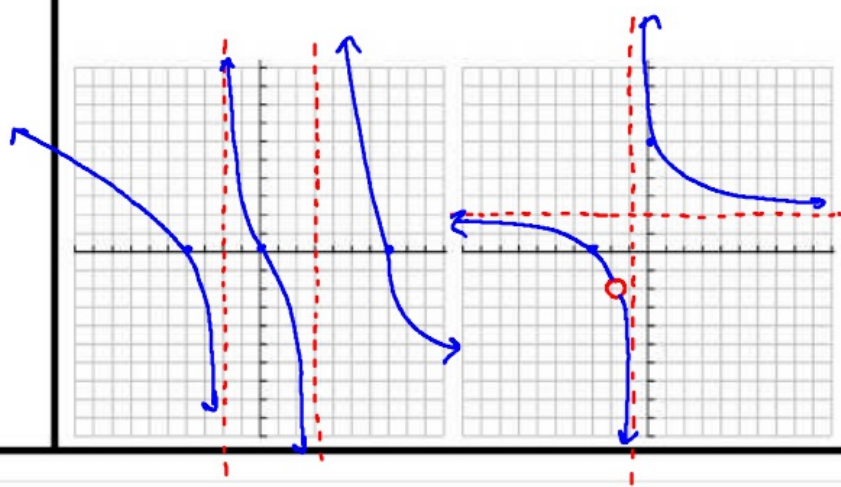
Hole: $x = -2$

Vertical Asymptote: $x = -1$

Horizontal Asymptote: $y = 2$

Domain: $(-\infty, -2) \cup (-2, -1) \cup (-1, \infty)$

Range: $(-\infty, 2) \cup (2, \infty)$



$$\frac{2(x+3)(x+2)}{(x+2)(x+1)}$$

$$\frac{2(x+3)}{x+1}$$

$$\frac{2(-2+3)}{-2+1}$$

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

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

Zeros:

$$x = \pm 2$$

y-intercepts:

$$(0, \frac{4}{9})$$

Points of Discontinuity:

$$x = \pm 3$$

Hole: None

Vertical Asymptote:

$$x = \pm 3$$

Horizontal Asymptote:

$$y = 1$$

Domain:

$$(-\infty, -3) \cup (-3, 3) \cup (3, \infty)$$

Range:

$$f(x) = \frac{x^2-x-6}{x^2-2x-8} \frac{(x-3)(x+2)}{(x-4)(x+2)}$$

Zeros:

$$x = 3$$

y-intercepts:

$$(0, \frac{3}{4})$$

Points of Discontinuity:

$$x = -2, 4$$

Hole: $x = -2$

Vertical Asymptote:

$$x = 4$$

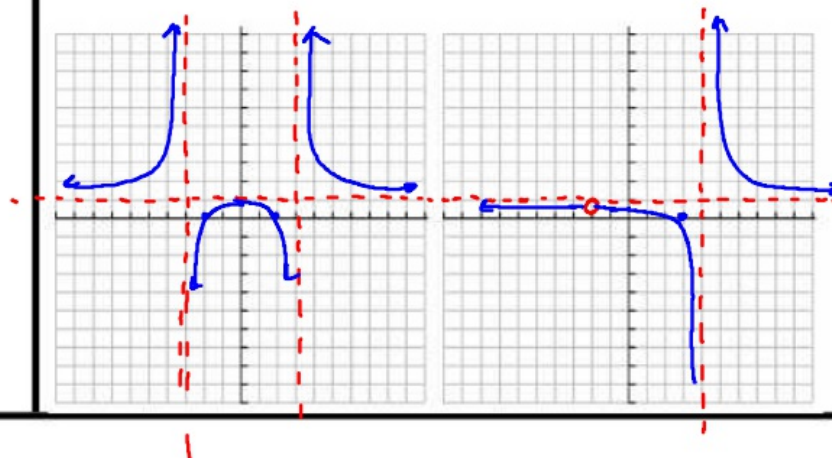
Horizontal Asymptote:

$$y = 1$$

Domain:

$$(-\infty, -2) \cup (-2, 4) \cup (4, \infty)$$

Range:



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

$$\frac{-2-3}{-2-4} = \frac{-5}{-6}$$

1. Give everything about the following functions (*Hint: zeroes, asymptotes, intercepts, holes, domain*) and sketch a graph. **Make sure you graph all important information.** **Make sure to label your axis.**

$$y = \frac{3}{x+1} + 2$$

H.A. \nearrow

P.O.D $x = -1$

V.A.: $x = -1$

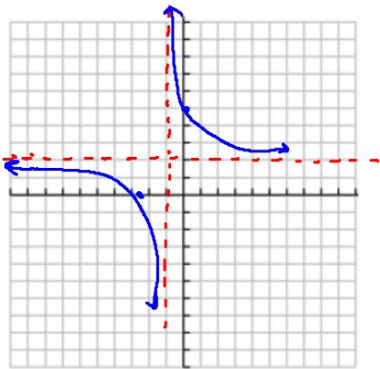
H.A.: $y = 2$

Zeroes: $x = -\frac{5}{2}$

Holes: None

y-intercept: $(0, 5)$

Domain: $(-\infty, -1) \cup (-1, \infty)$



$$y = \frac{-4}{2x-1} - 1$$

P.O.D $x = \frac{1}{2}$

V.A. $x = \frac{1}{2}$

H.A. $y = -1$

Zeros $x = \frac{3}{2}$

Holes None

y-intercept $(0, 3)$

Domain $(-\infty, \frac{1}{2}) \cup (\frac{1}{2}, \infty)$

$$\frac{-4}{2x-1} - 1 = 0$$

$$\frac{-4}{2x-1} = 1$$

$$-4 = 2x - 1$$

$$-3 = 2x$$

$$x = -\frac{3}{2}$$

