

Analyzing rational functions

Date _____

For each function, identify the holes, intercepts, horizontal asymptote, vertical asymptotes behavior and domain.

$$1) f(x) = \frac{x^2 - 3x}{4x - 4}$$

Holes: None

Horz. Asym.: None

x-intercepts: 0, 3, y-intercept: 0

Domain: All reals except 1

Vert. Asym. behavior:

$$\text{as } x \rightarrow 1^+, f(x) \rightarrow -\infty$$

$$\text{as } x \rightarrow 1^-, f(x) \rightarrow +\infty$$

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

Holes: $x = 2$

Horz. Asym.: $y = 2$

x-intercepts: -4, y-intercept: 4

Domain: All reals except -2, 2

Vert. Asym. behavior:

$$\text{as } x \rightarrow -2^+, f(x) \rightarrow \infty$$

$$\text{as } x \rightarrow -2^-, f(x) \rightarrow -\infty$$

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

Holes: $x = -3$

Horz. Asym.: $y = -\frac{1}{3}$

x-intercepts: 2, y-intercept: None

Domain: All reals except -3, 0

Vert. Asym. behavior:

$$\text{as } x \rightarrow 0^+, f(x) \rightarrow \infty$$

$$\text{as } x \rightarrow 0^-, f(x) \rightarrow -\infty$$

$$4) f(x) = -\frac{4}{x+4}$$

Holes: None

Horz. Asym.: $y = 0$

x-intercepts: None, y-intercept: -1

Domain: All reals except -4

Vert. Asym. behavior:

as $x \rightarrow -4^+$, $f(x) \rightarrow -\infty$

as $x \rightarrow -4^-$, $f(x) \rightarrow \infty$

$$5) f(x) = \frac{x^2 + 6x + 8}{4x + 12}$$

Holes: None

Horz. Asym.: None

x-intercepts: $-4, -2$, y-intercept: $\frac{2}{3}$

Domain: All reals except -3

Vert. Asym. behavior:

as $x \rightarrow -3^+$, $f(x) \rightarrow -\infty$

as $x \rightarrow -3^-$, $f(x) \rightarrow \infty$

$$6) f(x) = \frac{x^3 + x^2 - 12x}{-3x^2 + 12}$$

Holes: None

Horz. Asym.: None

x-intercepts: $0, 3, -4$, y-intercept: 0

Domain: All reals except $-2, 2$

Vert. Asym. behavior:

as $x \rightarrow -2^+$, $f(x) \rightarrow \infty$

as $x \rightarrow -2^-$, $f(x) \rightarrow -\infty$

as $x \rightarrow 2^+$, $f(x) \rightarrow \infty$

as $x \rightarrow 2^-$, $f(x) \rightarrow -\infty$