

Find any holes existing in the following functions. Find all asymptotes.

$$1. f(y) = \frac{y^2 - 16}{y^2 - 7y + 12}$$

hole (4, 8)

VA $x = 3$

HA: $y = 1$

Slant none

x-unt (-4, 0)

y-unt (0, -4/3)

$\mathbb{R}(-\infty, 3) \cup (3, 4) \cup (4, \infty)$

$$2. f(x) = \frac{2x^2 + 11x + 5}{3x^2 + 17x + 10}$$

hole: (5, 9/13)

VA $x = -2/3$

HA $y = 2/3$

Slant none

x-unt (-1/2, 0)

y-unt (0, 1/2)

$\mathbb{R}(-\infty, -5) \cup (-5, -2/3) \cup (-2/3, \infty)$

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

V.A
trumps
hole

hole: none

VA: $x = -1$

HA $y = 1/2$

Slant None

x-unt (1, 0)

y-unt (0, -1/2)

$\mathbb{R}(-\infty, -1) \cup (-1, \infty)$

$$4. f(x) = \frac{-15 - x + 6x^2}{3x^2 + 4x - 15}$$

hole (5/3, 19/4)

VA $x = -3$

HA $y = -2$

Slant none

x-unt: (-3/2, 0)

y-unt (0, 1)

$\mathbb{R}(-\infty, -3) \cup (-3, 5/3) \cup (5/3, \infty)$

$$5. f(x) = \frac{54 - 6x - 4x^2}{4x^2 - 81}$$

hole (-9/2, -5/6)

VA = $9/2 = x$

HA = $y = -1$

Slant none

x-unt (3, 0)

y-unt (0, -2/3)

dom (0, -9/2) \cup (-9/2, 9/2) \cup (9/2, ∞)

$$6. f(x) = \frac{6x^2 + x + 12}{3x^2 - 5x - 2}$$

hole none

VA $x = 2$ $x = -1/3$

HA $y = 2$

Slant none

x-unt none

y-unt (0, -6)

dom $(-\infty, -1/3) \cup (-1/3, 2) \cup (2, \infty)$

$$7. f(x) = \frac{x^2 + 3x}{x^3 + 2x^2 + x}$$

hole (0, 3)

VA: $x = -1$

HA: $y = 0$

Slant none

x-unt (-3, 0)

y-unt: none

$\mathbb{R}(-\infty, -1) \cup (-1, 0) \cup (0, \infty)$

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