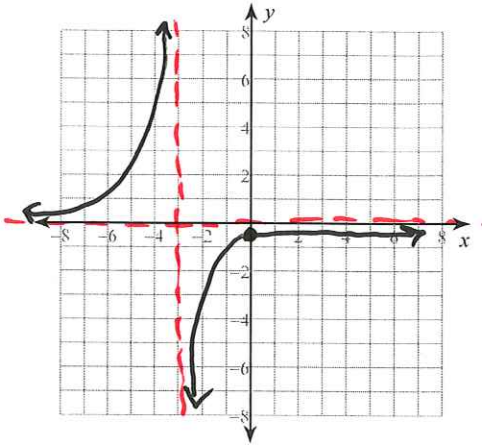


Unit 4 Test 2 Study Guide

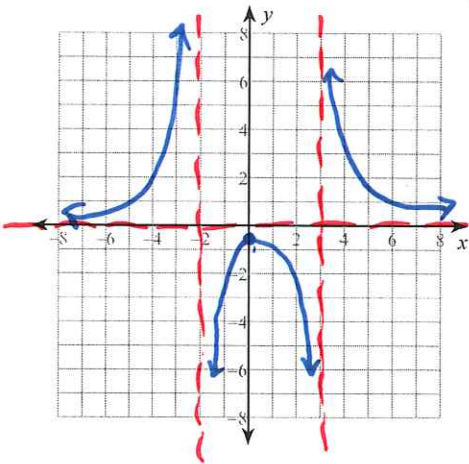
Identify the holes, vertical asymptotes, x-intercepts, horizontal asymptote, then sketch the graph. For each even problem, state the positive and negative intervals, the domain and the end behavior.

$$1) f(x) = \frac{1}{-3x - 9}$$

$$\begin{aligned} \text{VA } x &= -3 \\ \text{HA } y &= 0 \\ \text{x-int } & \text{N/A} \\ \text{y-int } & -1/9 \end{aligned}$$



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



$$\begin{aligned} \text{Domain} \\ (-\infty, -2) \cup (-2, 3) \cup (3, \infty) \end{aligned}$$

$$\begin{aligned} \text{Pos} \\ (-\infty, -2) \cup (3, \infty) \end{aligned}$$

$$\begin{aligned} \text{Neg} \\ (-2, 3) \end{aligned}$$

$$\text{VA } x = 3 \quad x = -2$$

$$\text{HA } y = 0$$

$$\text{x-int } \text{N/A}$$

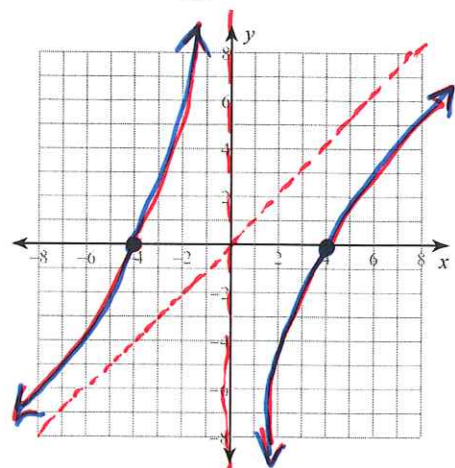
$$\text{y-int } -1/2$$

End Beh.

$$\text{As } x \rightarrow -\infty \quad y \rightarrow 0$$

$$\text{As } x \rightarrow \infty \quad y \rightarrow 0$$

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



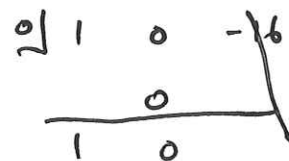
VA $x=0$

HA N/A

SA $y=x$

x-int $(4,0) (-4,0)$

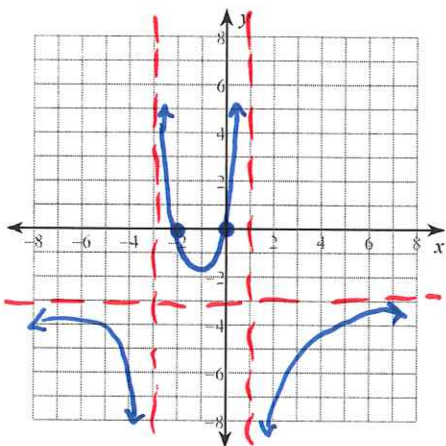
y-int N/A



$$4) f(x) = \frac{-3x^2 - 6x}{x^2 + 2x - 3} = \frac{-3x(x+2)}{(x+3)(x-1)}$$

Domain

$(-\infty, -3) (-3, 1) (1, \infty)$



VA $x=-3$

$x=1$

HA $y=-3$

x-int $(0,0) (-2,0)$

y-int $(0,0)$

Pos.

$(-3, -2) (0, 1)$

Neg

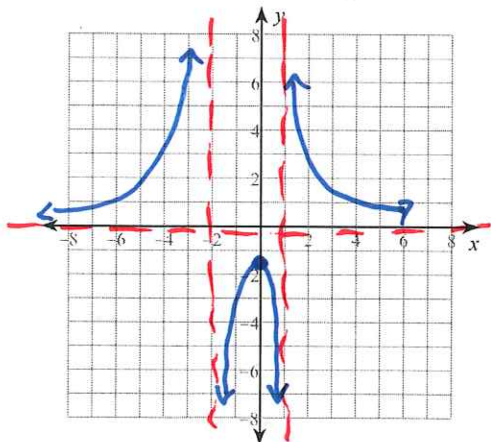
$(-\infty, -3) (-2, 0) (1, \infty)$

End Behavior

As $x \rightarrow -\infty$ $y \rightarrow -3$

As $x \rightarrow +\infty$ $y \rightarrow -3$

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



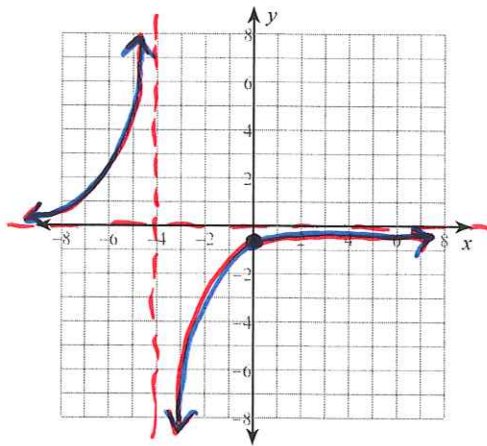
VA $x=-2$ $x=1$

HA $y=0$

x-int N/A

y-int $(0, -1.5)$

$$6) f(x) = \frac{1}{-x-4}$$



VA $x = -4$

HA $y = 0$

x-int n/A

y-int $(0, -0.25)$

Domain

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

Pos. $(-\infty, -4)$

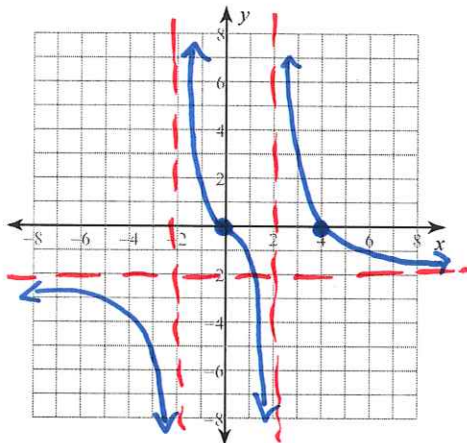
Neg. $(-4, \infty)$

End Behavior

As $x \rightarrow -\infty$ $y \rightarrow 0$

As $x \rightarrow \infty$ $y \rightarrow 0$

$$7) f(x) = \frac{-2x^2 + 8x}{x^2 - 4} = \frac{-2x(x-4)}{(x+2)(x-2)}$$



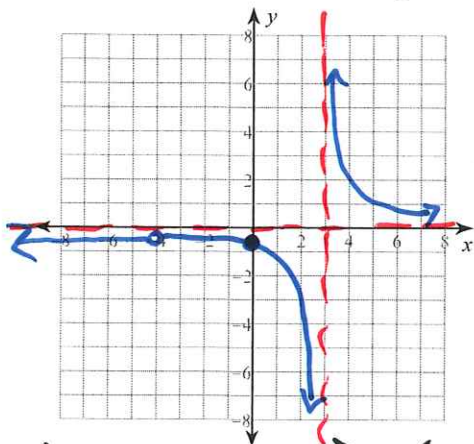
VA: $x = -2$ $x = 2$

HA: $y = -2$

x-int: $(0, 0)$ $(4, 0)$

y-int: $(0, 0)$

$$8) f(x) = \frac{x+4}{x^2+x-12} = \frac{x+4}{(x+4)(x-3)} = \frac{1}{x-3}$$



VA: $x = 3$

HA: $y = 0$

x-int: n/A

y-int: $(0, -0.3)$

hole: $(-4, -0.14)$

End Beh:

as $x \rightarrow -\infty$ $y \rightarrow 0$

as $x \rightarrow \infty$ $y \rightarrow 0$

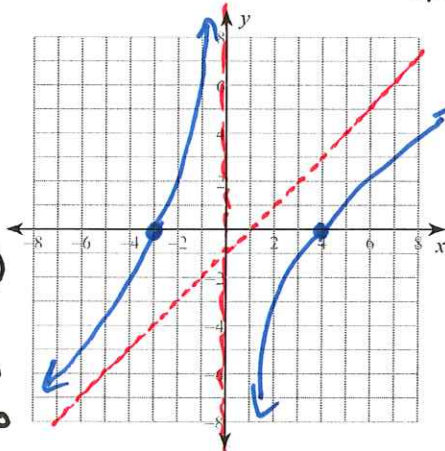
Pos $(3, \infty)$

Neg $(-\infty, 3)$

Domain

$(-\infty, -4) \cup (-4, 3) \cup (3, \infty)$

$$9) f(x) = \frac{x^2 - x - 12}{-4x} = \frac{(x-4)(x+3)}{-4x}$$



VA $x = 0$

HA n/A

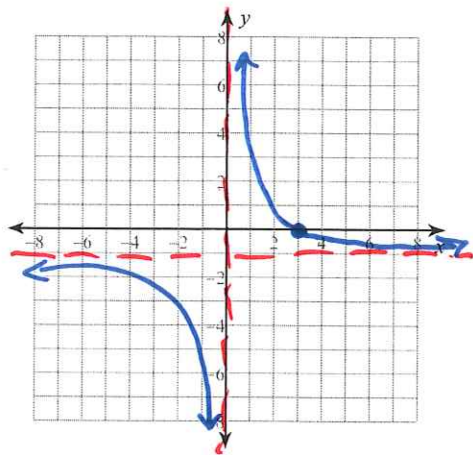
SA $y = x - 1$

x-int: $(4, 0)$
 $(-3, 0)$

y-int: n/A

$$\begin{array}{r|rr} 0 & 1 & -1 & -12 \\ & & 0 & \\ & 1 & -1 & \end{array}$$

10) $f(x) = \frac{-x+3}{x}$



VA $x=0$

HA $y=-1$

x-int: $(3,0)$

y-int: N/A

Domain: $(-\infty, 0) \cup (0, \infty)$

Pos $(0, 3)$

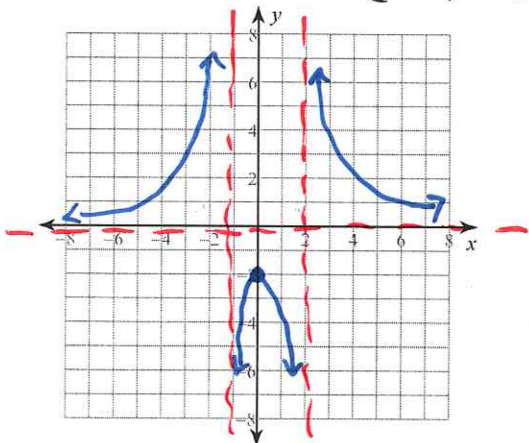
Neg $(-\infty, 0) \cup (3, \infty)$

End Beh:

as $x \rightarrow -\infty$ $y \rightarrow \underline{-1}$

as $x \rightarrow \infty$ $y \rightarrow \underline{-1}$

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



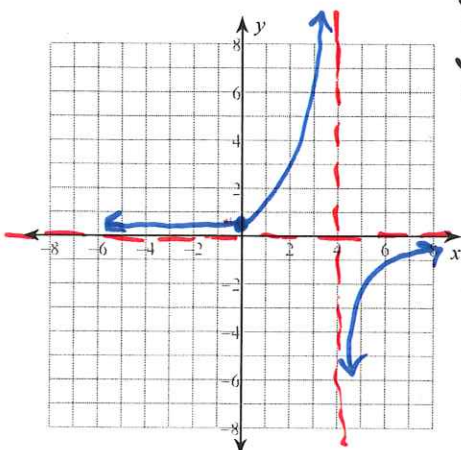
VA $x=2$ $x=-1$

HA $y=0$

x-int N/A

y-int $(0, -2)$

12) $f(x) = \frac{1}{-4x+16}$



VA $x=4$

HA $y=0$

x-int N/A

y-int $(0, 0.06)$

End Beh.

as $x \rightarrow -\infty$ $y \rightarrow 0$

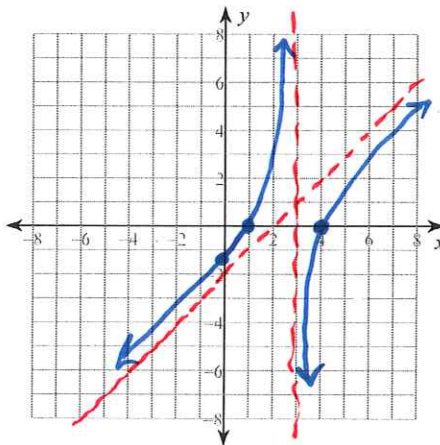
as $x \rightarrow \infty$ $y \rightarrow 0$

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

Pos $(-\infty, 4)$

Neg $(4, \infty)$

13) $f(x) = \frac{x^2 - 5x + 4}{x-3} = \frac{(x-4)(x-1)}{(x-3)}$



VA $x=3$

HA N/A

SA $y=x-2$

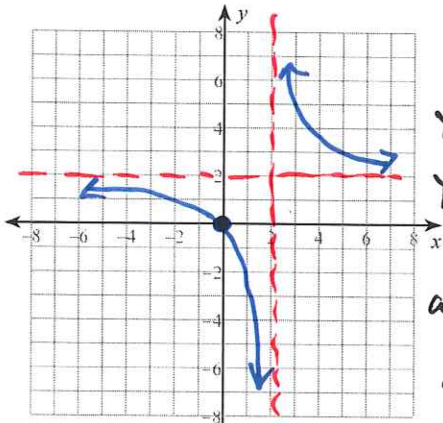
x-int $(4, 0)$

$(1, 0)$

y-int $(0, -1.3)$

$$\begin{array}{r} 3 \overline{) 1 \ -5 \ 4} \\ \underline{3} \\ 1 \ -2 \end{array}$$

$$14) f(x) = \frac{2x}{x-2}$$



VA $x=2$

HA $y=2$

x-int $(0,0)$

y-int $(0,0)$

End Beh.

as $x \rightarrow -\infty$

$y \rightarrow 2$

as $x \rightarrow \infty$

$y \rightarrow 2$

Domain

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

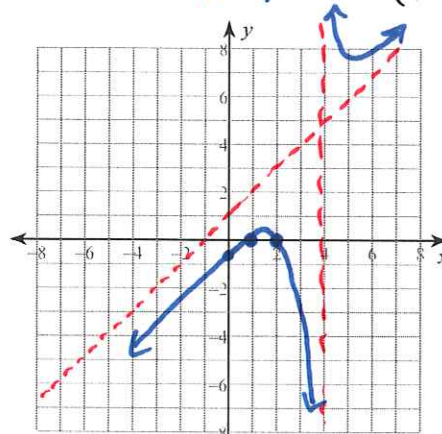
Pos

$(-\infty, 0) \cup (2, \infty)$

Neg

$(0, 2)$

$$15) f(x) = \frac{x^2 - 3x + 2}{x-4} = \frac{(x-2)(x-1)}{(x-4)}$$



VA $x=4$

HA N/A

SA $y=x+1$

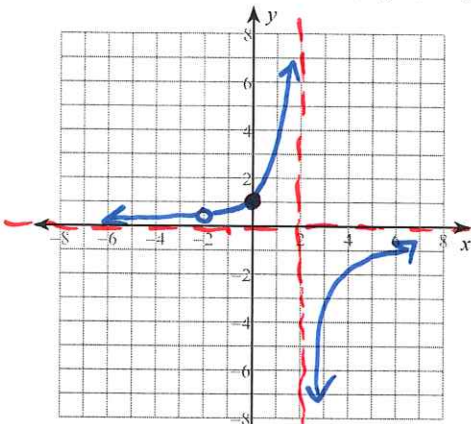
x-int $(2,0)$

$(1,0)$

y-int $(0,-.5)$

$$\begin{array}{r} 4 \overline{) 1 - 3 \ 2} \\ \underline{1 1} \\ 1 1 \end{array}$$

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



VA $x=2$

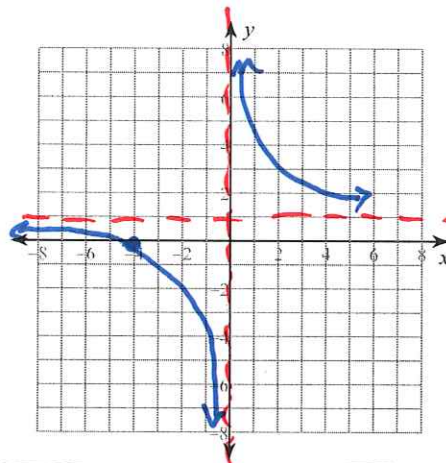
HA $y=0$

x-int N/A

y-int $(0,1)$

hole $(-2, .5)$

$$17) f(x) = \frac{x+4}{x}$$



VA $x=0$

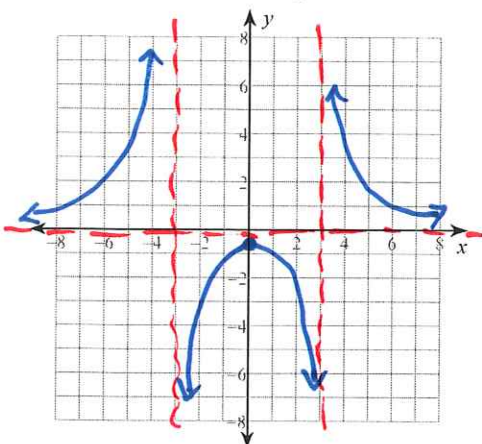
HA $y=1$

x-int $(-4,0)$

y-int N/A

End Beh. as $x \rightarrow -\infty$ $y \rightarrow 0$
as $x \rightarrow \infty$ $y \rightarrow 0$

$$18) f(x) = \frac{3}{x^2-9} = \frac{3}{(x-3)(x+3)}$$



VA $x=3$

$x=-3$

HA $y=0$

x-int N/A

y-int $(0,-.3)$

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

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

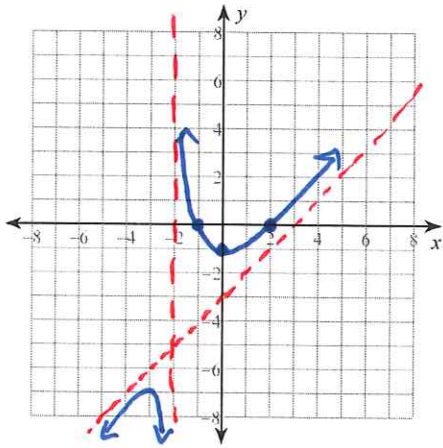
Neg $(-3, 3)$

End Beh:

as $x \rightarrow -\infty$ $y \rightarrow 0$

as $x \rightarrow \infty$ $y \rightarrow 0$

$$19) f(x) = \frac{x^2 - x - 2}{x+2} \quad \frac{(x-2)(x+1)}{x+2}$$



VA $x = -2$

HA N/A

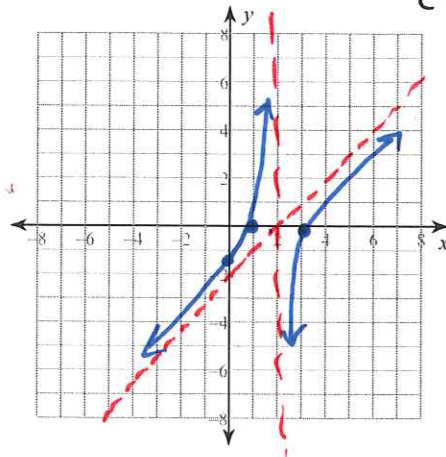
SA $y = x - 3$

x-int $(2, 0)$ $(-1, 0)$

y-int $(0, -1)$

$$\begin{array}{r} -2 \overline{) 1 \quad -1 \quad -2} \\ \underline{ -2} \\ 1 \quad -3 \end{array}$$

$$20) f(x) = \frac{x^2 - 4x + 3}{x-2} \quad \frac{(x-3)(x-1)}{x-2}$$



VA $x = 2$

HA N/A

SA $y = x - 2$

x-int $(3, 0)$

$(1, 0)$

y-int $(0, -1.5)$

$$\begin{array}{r} 2 \overline{) 1 \quad -4 \quad 3} \\ \underline{ 2} \\ 1 \quad -2 \end{array}$$

Domain

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

Pos

Neg

End Beh

as $x \rightarrow -\infty$ $y \rightarrow -\infty$

as $x \rightarrow \infty$ $y \rightarrow \infty$