

W4 - 3.3 Quotient of Linear Functions

MHF4U

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SOLUTIONS

1) State the equation of the vertical and horizontal asymptotes for each function.

a) $p(x) = \frac{x}{x-6}$

VA: $x = 6$

HA: $y = 1$

b) $q(x) = \frac{3x}{x+4}$

VA: $x = -4$

HA: $y = 3$

c) $r(x) = \frac{x-1}{x+1}$

VA: $x = -1$

HA: $y = 1$

d) $\frac{5x-2}{2x+3}$

VA: $x = -1.5$

HA: $y = 2.5$

2) Graph each of the following functions. Make sure to identify key characteristics of the functions including intercepts and asymptotes.

a) $f(x) = \frac{x}{x-5}$

VA: $x = 5$

HA: $y = 1$

x-int: $0 = \frac{x}{x-5}$

$0 = x$

$(0, 0)$

y-int: $y = \frac{0}{0-5}$

$y = 0$

$(0, 0)$

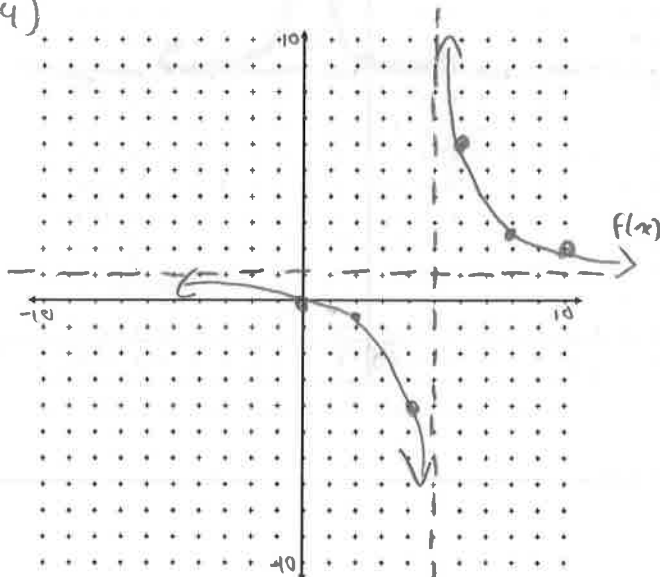
Other points:

$f(2) = \frac{2}{2-5} = -0.67$

$(2, -0.67)$

$f(4) = \frac{4}{4-5} = -4$

$(4, -4)$



b) $c(x) = \frac{4x}{x+8}$

VA: $x = -8$

HA: $y = 4$

x-int: $0 = \frac{4x}{x+8}$

$4x = 0$

$x = 0$

$(0, 0)$

or y-int also $(0, 0)$

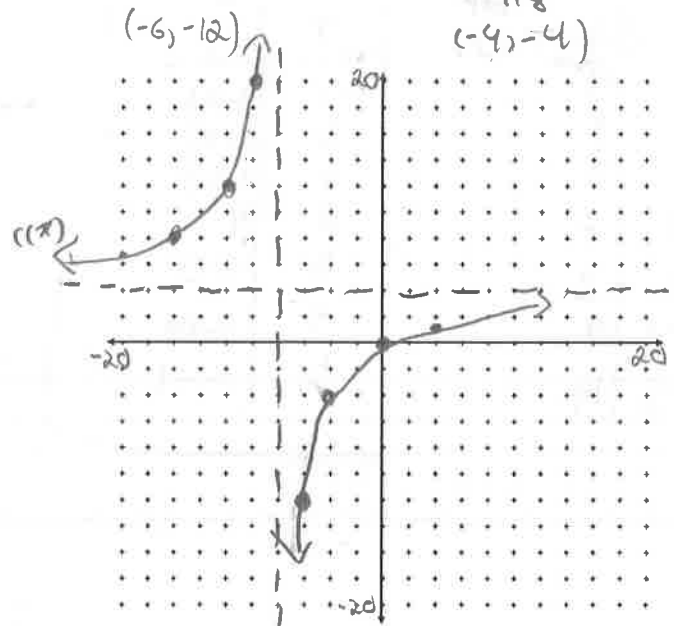
Other points:

$f(-6) = \frac{4(-6)}{-6+8} = -12$

$(-6, -12)$

$c(-4) = \frac{4(-4)}{-4+8} = -4$

$(-4, -4)$



$$c) k(x) = \frac{x+1}{4-x} = \frac{x+1}{-x+4}$$

$$VA: x=4$$

$$HA: y=-1$$

$$x\text{-int: } 0 = \frac{x+1}{-x+4}$$

$$0 = x+1$$

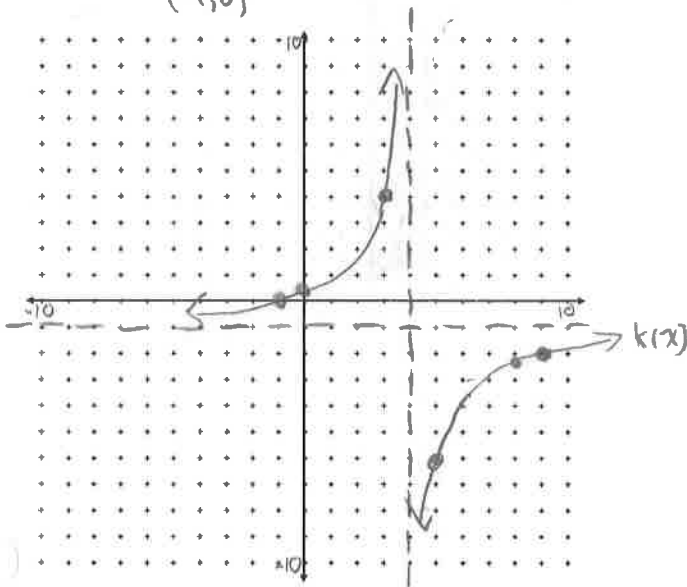
$$x = -1$$

$$(-1, 0)$$

Another point:

$$k(3) = \frac{3+1}{4-3} = 4$$

$$(3, 4)$$



$$d) w(x) = \frac{x+2}{4x-5}$$

$$VA: x=1.25$$

$$HA: y=0.25$$

$$x\text{-int: } 0 = \frac{x+2}{4x-5}$$

$$0 = x+2$$

$$x = -2$$

$$(-2, 0)$$

$$y\text{-int: } w(0) = \frac{0+2}{4(0)-5}$$

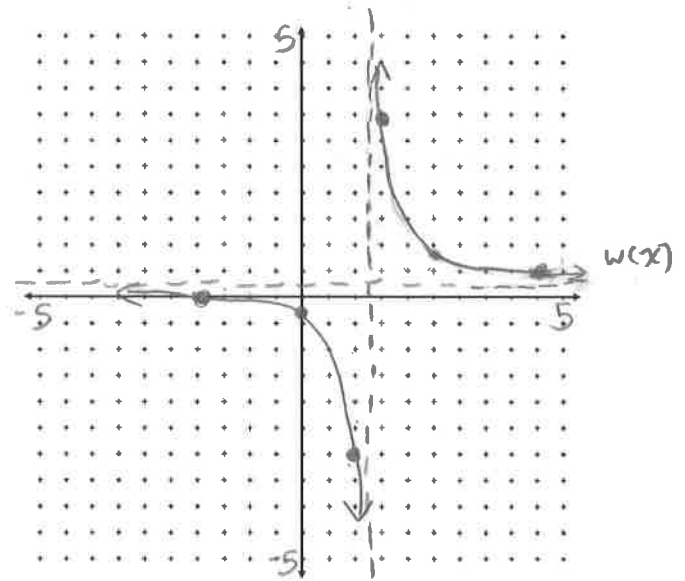
$$= \frac{2}{-5}$$

$$= -0.4$$

$$(0, -0.4)$$

Another point: $w(1) = \frac{1+2}{4(1)-5} = -3$

$$(1, -3)$$



$$e) d(x) = \frac{-2x-3}{x+5}$$

$$VA: x=-5$$

$$HA: y=-2$$

$$x\text{-int: } 0 = -2x-3$$

$$x = -1.5$$

$$(-1.5, 0)$$

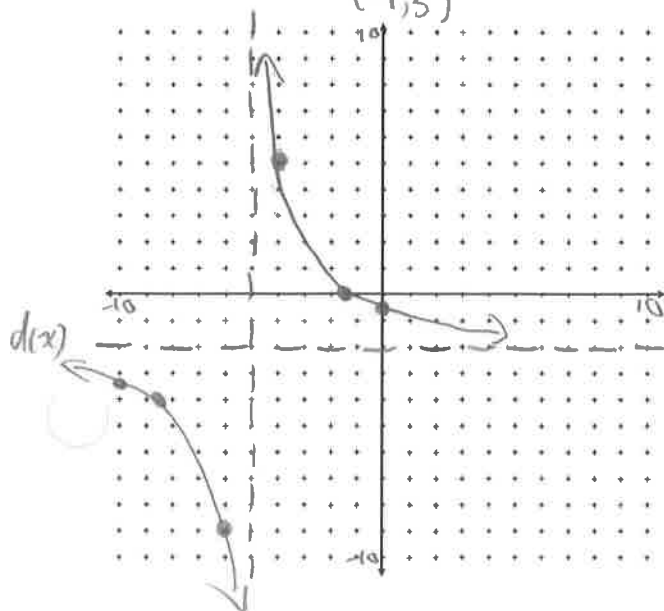
$$y\text{-int: } d(0) = \frac{-2(0)-3}{0+5}$$

$$d(0) = -0.6$$

$$(0, -0.6)$$

Another Point: $f(-4) = \frac{-2(-4)-3}{-4+5} = 5$

$$(-4, 5)$$



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

$$VA: x=-0.5$$

$$HA: y=1.5$$

$$x\text{-int: } 0 = 3x+1$$

$$x = -0.33$$

$$(-0.33, 0)$$

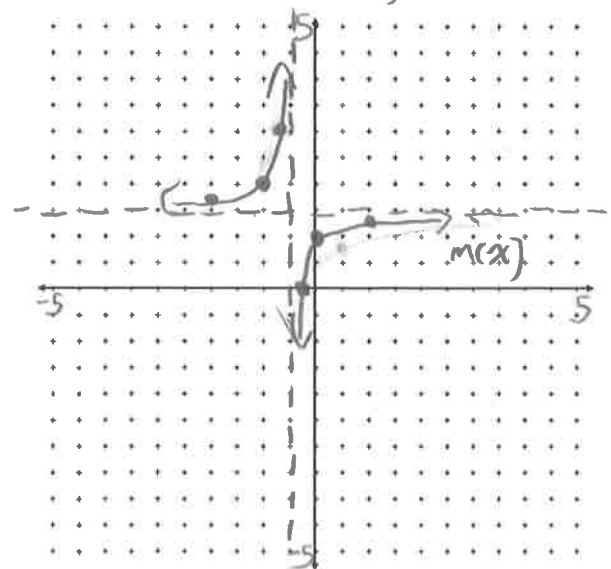
$$y\text{-int:}$$

$$m(0) = \frac{1}{1} = 1$$

$$(0, 1)$$

Another point: $m(1) = \frac{3(1)+1}{2(1)+1} = \frac{4}{3} = 1.33$

$$(1, 1.33)$$



use graphing calculator / desmos

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

$$HA: y=0$$

$$VA: x=-2 \text{ and } x=-1$$

$$\begin{aligned} x\text{-int: } 0 &= x-2 \\ x &= 2 \\ (2, 0) \end{aligned}$$

$$\begin{aligned} y\text{-int: } g(0) &= \frac{0-2}{(0+2)(0+1)} = -1 \\ (0, -1) \end{aligned}$$

