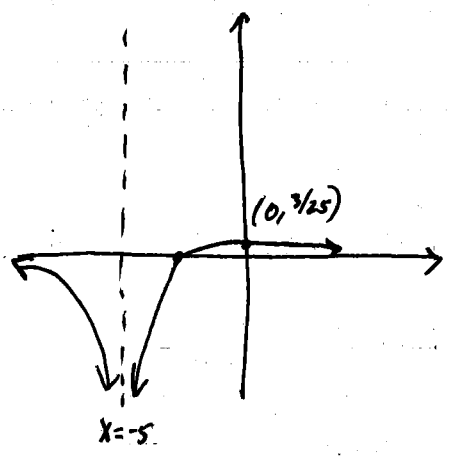


4.) $y = \frac{x+3}{(x+5)^2}$

ZK/LO: $x+3=0$
 $x = -3$

VA: $x+5=0$
 $x = -5$

lim $x \rightarrow \pm\infty = 0$



5.) $h(x) = \frac{x^2-4}{x^3+4x^2} = \frac{(x+2)(x-2)}{x^2(x+4)}$

x-int: $0 = x+2$ $0 = x-2$
 $x = -2$ $x = 2$

y-int: $h(0) = \frac{0^2-4}{0^3+4(0)^2} = -\frac{4}{0}$

VA: $x^2=0$ $x+4=0$
 $x = 0$ $x = -4$

NONE

HA: $\lim_{x \rightarrow \pm\infty} = 0$ $h(x) = 0$

6.) $k(x) = \frac{x(4-x)}{x^2-6x+5}$

x-int: $0 = x$ $0 = 4-x$
 $x = 0$ $x = 4$

$= \frac{x(4-x)}{(x-5)(x-1)}$

y-int: $k(0) = \frac{0(4-0)}{(0-5)(0-1)} = \frac{0}{5} = 0$

$= \frac{4x-x^2}{x^2-6x+5}$

VA: $x-5=0$ $x-1=0$
 $x = 5$ $x = 1$

HA: $y = -\frac{x^2}{x^2} = -1$

lim $x \rightarrow \pm\infty = -1$

7.) $g(x) = \frac{x^2-9}{x^2+9} = \frac{(x+3)(x-3)}{x^2+9}$

x-int: $0 = x+3$ $0 = x-3$
 $x = -3$ $x = 3$

y-int: $g(0) = \frac{0^2-9}{0^2+9} = -\frac{9}{9} = -1$

VA: $x^2+9=0$ $x^2=-9$
NONE

HA: $\lim_{x \rightarrow \pm\infty} \frac{x^2}{x^2} = 1$
 $y = 1$

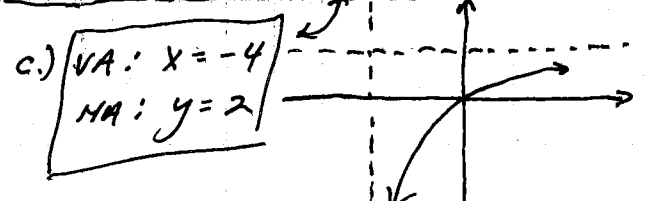
9.) $G(x) = \frac{2x}{x+4}$

-5	-4.1	-4.01	-4	-3.99	-3.9	-3
10	82	802	\emptyset	-798	-78	-6

$G(x)$ approaches infinity as x approaches -4 from the left and negative infinity as x approaches -4 from the right.

5	10	100	1000	-5	-10	-100	-1000
1.111	1.429	1.923	1.992	10	3.333	2.083	2.008

As x takes very large positive values, $G(x)$ approaches 2 from below. As x takes very large negative values, $G(x)$ approaches 2 from above.



15.) a.) $y = \frac{1}{(x-5)^2} - 1$ VA: $x=5$ HA: $y=-1$ iii

b.) $y = \frac{x-2}{(x+1)(x-3)}$ VA: $x=-1$ $x=3$ HA: $y=0$ i

c.) $y = \frac{2x+4}{x-1}$ VA: $x=1$ HA: $y=2$ x-int: $\frac{2x+4=0}{x-1}$ $x = -2$ ii

d.) $y = \frac{1}{x+1} + \frac{1}{x-3}$ VA: $x=-1$ $x=3$ HA: $y=0$ x-int: $0 = \frac{1}{x+1} + \frac{1}{x-3}$
 $-\frac{1}{x+1} = \frac{1}{x-3}$ iv

e.) $y = \frac{1-x^2}{x-2} = \frac{(1+x)(1-x)}{x-2}$ VA: $x=2$ HA: NONE vi

f.) $y = \frac{1-4x}{2x+2} = \frac{1-4x}{2(x+1)}$ VA: $x=-1$ HA: $y=-2$ v

22) a.) $y = \frac{1}{x}$ translated right 1 and up 2

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

$$b.) \frac{1}{x-1} + 2 \cdot \frac{(x-1)}{(x-1)} = \frac{1}{x-1} + \frac{2x-2}{x-1}$$

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

c.) x-int: $0 = \frac{1}{x-1} + 2$ or $2x-1=0$

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

$$-2x+2=1$$

$$-2x = -1$$

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

$$2x=1$$

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

y-int: $\frac{1}{0-1} + 2$

$$-1+2=1$$

or $y = \frac{2(0)-1}{0-1}$

$$\frac{-1}{-1} = 1$$

$$(0,1)$$

26.) $g(x) = -\frac{1}{(x-2)^2} - 3$ $P=2$

Transformation of $\frac{1}{x^2}$ right, flipped over the x-axis and down 3.

VA: $x=2$ HA: $y=-3$ y-int: $-\frac{1}{(0-2)^2} - 3$

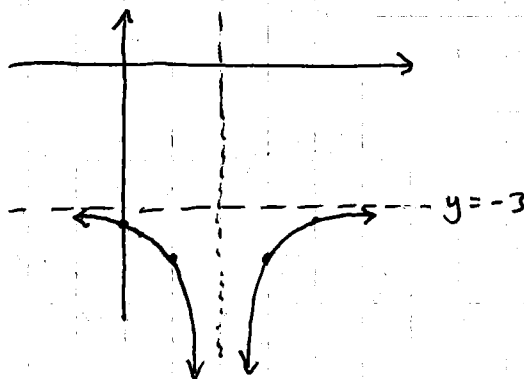
$$= -\frac{1}{4} - 3 = (0, -3\frac{1}{4})$$

x-int: $0 = -\frac{1}{(x-2)^2} - 3$

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

IMPOSSIBLE - LEFT SIDE WILL ALWAYS BE POSITIVE

$\boxed{NO\ x\text{-int}}$



36.) Zeros: $x = -2x = 3$

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

$$\Rightarrow \frac{(x+2)(x-3)}{(x+1)(x-2)} = y$$

HA: $y=1 \rightarrow \frac{x^2}{x^2} = 1 \checkmark$

y-int 3 $\rightarrow \frac{(0+2)(0-3)}{(0+1)(0-2)} = \frac{-6}{-2} = 3 \checkmark$

38.) Zeros: $x=0$

VA: $x = -2$ $x = 3$

$$\Rightarrow y = \frac{x}{(x+2)(x-3)}$$

HA: $y=0 \checkmark$

39.) $f(x) = \frac{x^2 - 11x + 18}{x-2}$

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

$$f(x) = x-9$$

HOLE AT $x=2$

$$f(2) = 2-9 = -7$$

$$\text{HOLE: } (2, -7)$$

40.) $g(x) = \frac{x^3 + 5x^2 + x + 5}{x+5}$

$$= \frac{x^2(x+5) + (x+5)}{x+5}$$

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

$$g(x) = x^2 + 1$$

HOLE AT $x = -5$

$$g(-5) = (-5)^2 + 1 = 26$$

$$\text{HOLE: } (-5, 26)$$

42.) Zeros: $x=2$ $x=3$ $\frac{(x-2)(x-3)}{(x-5)}$

VA: $x=5$

HA: $y=-3 \Rightarrow \frac{\text{Lead Term}}{\text{Lead Term}} = -3$

$$\frac{-3x^2}{x^2} \Rightarrow \frac{-3(x-2)(x-3)}{(x-5)^2}$$

$$g = \frac{-3(x-2)(x-3)}{(x-5)^2}$$