

Honors Math 3 - Graphing Rational Functions

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

VA: $x=4$
 HA: $y=1$
 hole: none

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

VA: $x=0$
 HA: $y=2$
 hole: none

$$3) g(x) = \frac{-2}{x^2-x-12}$$

$(x-4)(x+3)$
 VA: $x=4, x=-3$
 HA: $y=0$
 hole: none

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

VA: $x=-5, x=1$
 HA: $y=0$
 hole: none

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

$(x-3)(x+2)$
 VA: $x=3, x=-2$
 HA: $y=0$
 hole: none

$$6) p(x) = \frac{(x-11)(x+1)}{(x^2-10x-11)(x+1)}$$

VA: none
 HA: none
 hole: $x=-1$

$$7) f(x) = \frac{x^2+3x-4}{x-2}$$

$(x+4)(x-1)$

$$y = x + 5$$

$$\begin{array}{r}
 x-2 \overline{) x^2 + 3x - 4} \\
 \underline{-(x^2 + 2x)} \\
 5x - 4 \\
 \underline{5x - 10} \\
 6
 \end{array}$$

$$8) g(x) = \frac{x^2-7x+10}{x+2}$$

$$y = x - 9$$

$$\begin{array}{r}
 x+2 \overline{) x^2 - 7x + 10} \\
 \underline{-(x^2 + 2x)} \\
 -9x + 10 \\
 \underline{-9x - 18} \\
 28
 \end{array}$$

$$1) r(x) = \frac{2x^2 + 9x - 5}{x + 3}$$

$$y = 2x + 3$$

$$x + 3 \overline{) 2x^2 + 9x - 5}$$

$$\underline{-2x^2 - 6x}$$

$$3x - 5$$

$$\underline{3x + 9}$$

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

$$y = 3x$$

$$x^2 \overline{) 3x^3 + 2x - 3}$$

fill in a 0 for x^2 term

$$\underline{3x^3 + 0x^2}$$

$$\underline{-3x^3 + 0x^2 + 2x - 3}$$

$$\underline{0x^2 + 2x}$$

$$\underline{0x^2 + 0x}$$

$$2x$$

$$3) g(x) = \frac{x^3 + 5x^2 - 10x - 50}{x^2 + 4x + 4}$$

$$y = x + 1$$

$$x^2 + 4x + 4 \overline{) x^3 + 5x^2 - 10x - 50}$$

$$\underline{-x^3 - 4x^2 - 4x}$$

$$x^2 - 14x - 50$$

$$\underline{x^2 + 4x + 4}$$

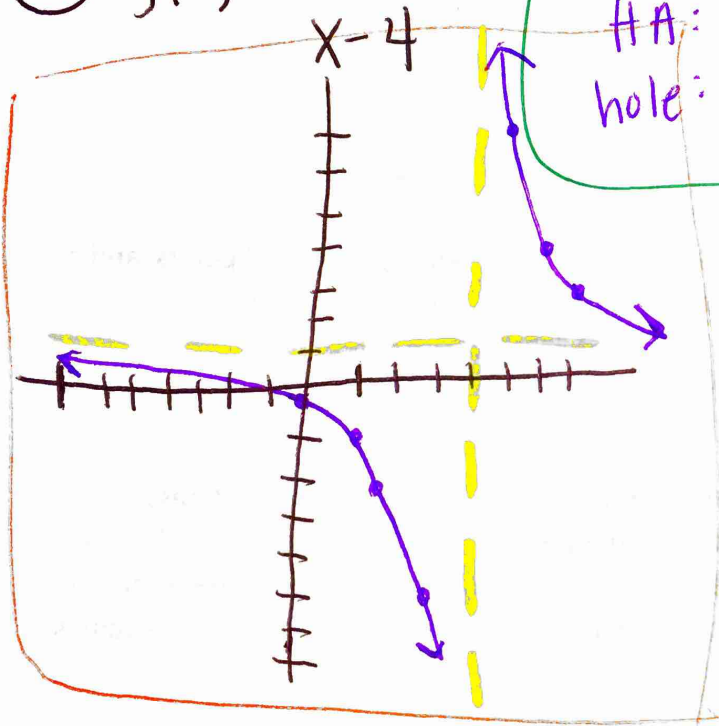
If the

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

* the degree is larger on top by more than 1
so there is

NO OBLIQUE

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



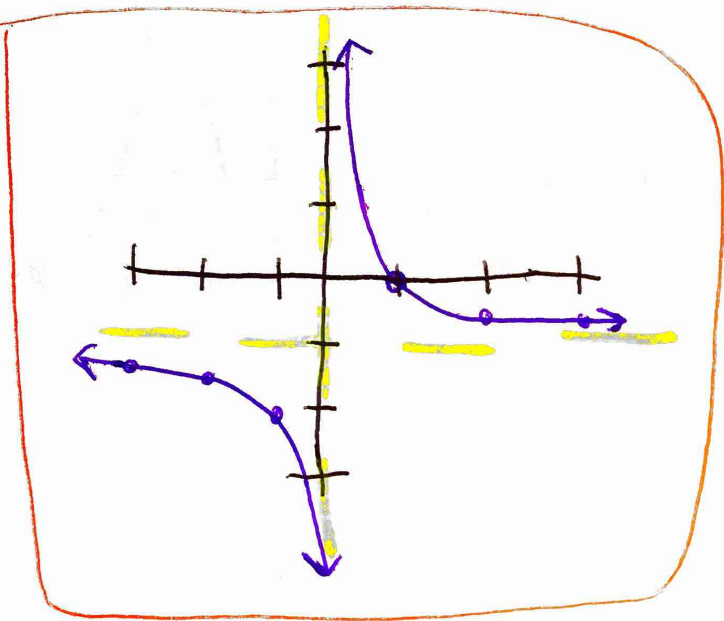
VA: $x=4$
HA: $y=1$
hole: none

x	y
3	-5
2	-2
1	-1
0	-.5
5	7
6	4
7	3

(7, 3)

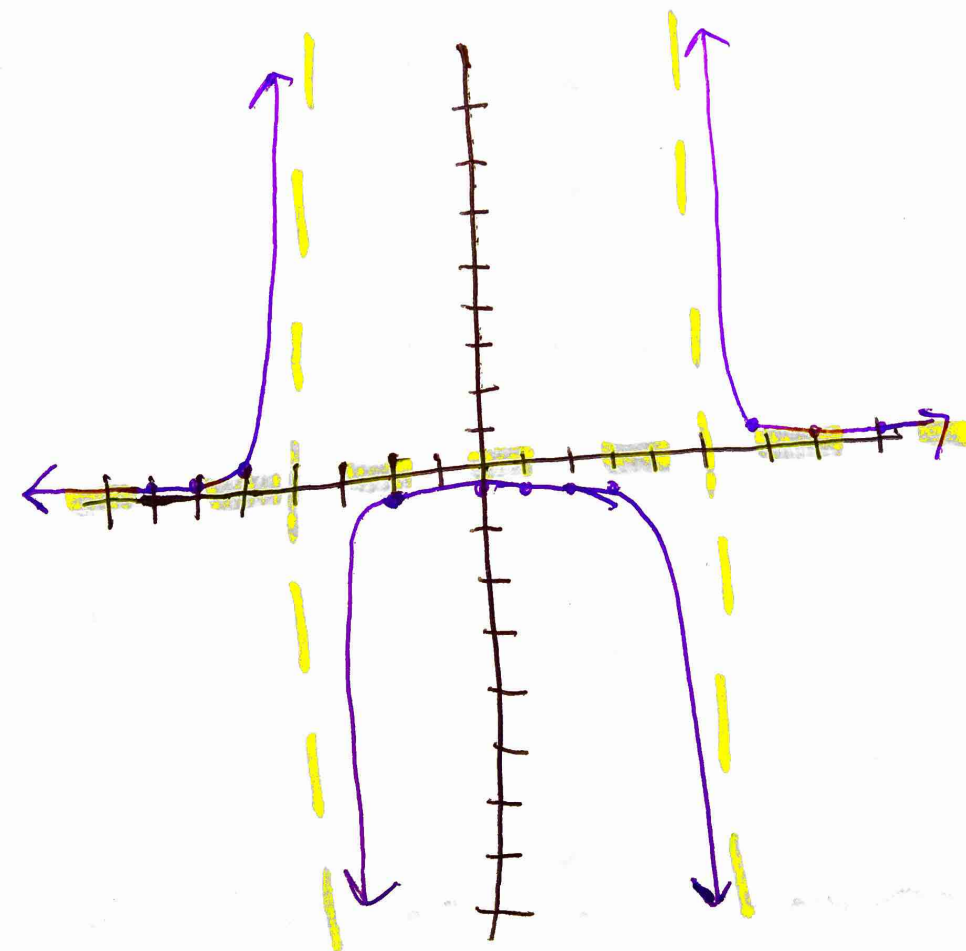
$h(x) = \frac{1-x}{x}$
 VA: $0 = x$
 HA: $y = -1$
 hole: none

x	y
-3	-1.333 or $-\frac{4}{3}$
-2	-1.5
-1	-2
1	0
2	$-\frac{1}{2}$
3	$-\frac{2}{3} = -.667$



16 $m(x) = \frac{2}{x^2 - x - 20}$
 $(x-5)(x+4)$
 VA: $x = 5, x = -4$
 HA: $y = 0$
 hole: none

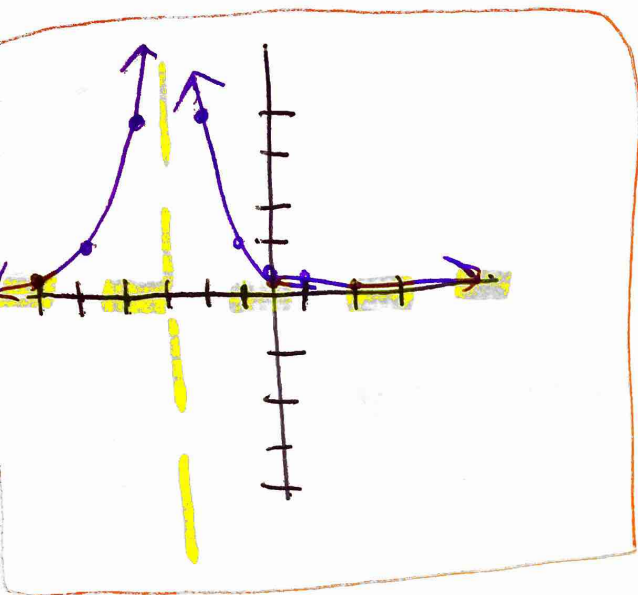
x	y
-5	.2
-6	.091
-7	.056
-2	-.14
0	-.11
1	-.1
2	-.11
6	.2
7	.091
8	.056



$$p(x) = \frac{4}{(x+3)^2}$$

VA: $x = -3$
 HA: $y = 0$
 hole: none

x	y
-6	.44
-5	1
-4	4
-2	4
-1	1
0	.44
1	.25
3	.111



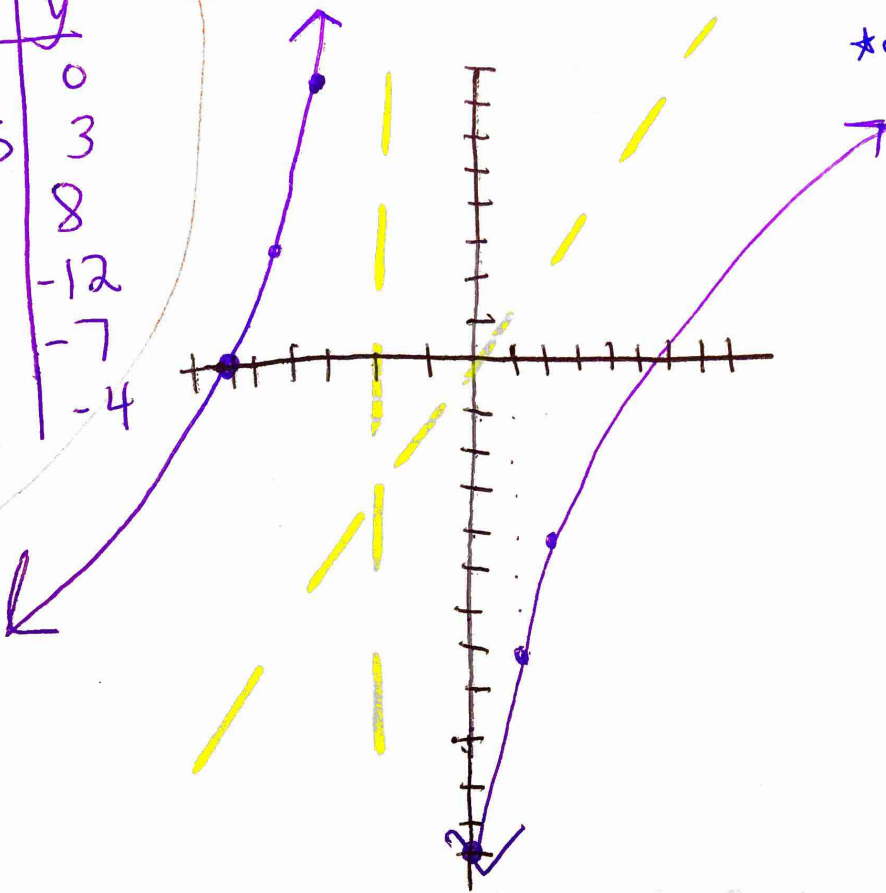
18) $h(x) = \frac{x^2 + 2x - 24}{x + 2} \rightarrow \frac{(x+6)(x-4)}{x+2}$

VA: $x = -2$
 HA: $y = x$ OBLIQUE!
 hole: none

x	y
-6	0
-5	3
-4	8
0	-12
1	-7
2	-4

*degree is bigger on top & $x+2$ is not a factor!

$$x+2 \overline{) \begin{array}{r} x^2 + 2x - 24 \\ \underline{x^2 + 2x} \\ -24 \end{array}}$$



$$f(x) = \frac{x^2 - 3x - 28}{x - 1}$$

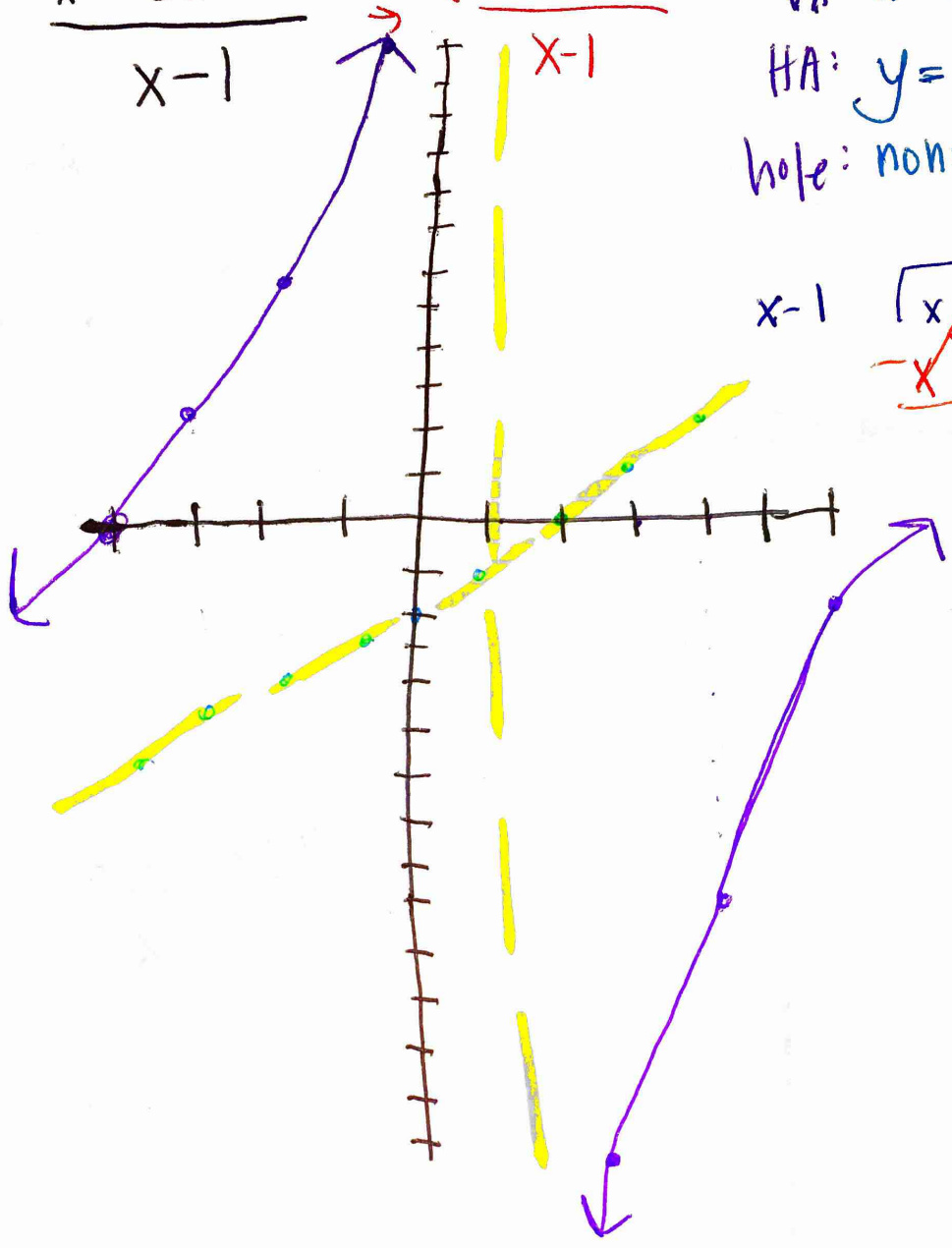
$$(x-7)(x+4)$$

VA: $x=1$

HA: $y=x-2$

hole: none

x	y
-4	0
-3	2.5
-2	6
-1	12
0	28
2	-30
3	-14
4	-8
6	-2



$$\begin{array}{r}
 x-2 \\
 \hline
 x^2 - 3x - 28 \\
 -x^2 + x \\
 \hline
 -2x - 28 \\
 -2x + 2
 \end{array}$$

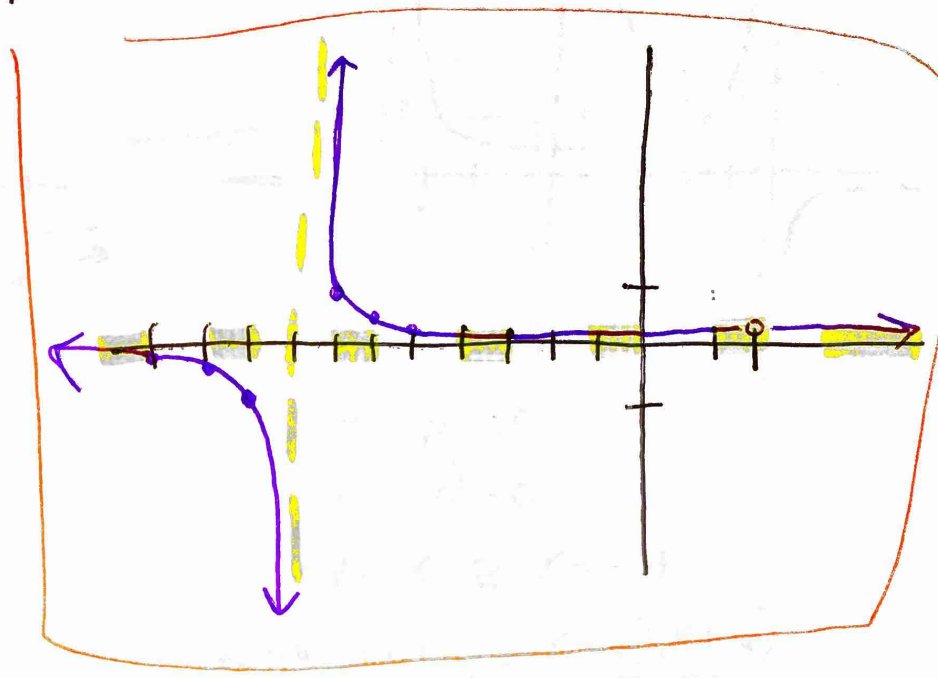
$$\textcircled{20} h(x) = \frac{x-2}{x^2+6x-16} \rightarrow \frac{(x-2)}{(x+8)(x-2)}$$

VA: $x = -8$

HA: $y = 0$

hole: $x = 2$

x	y
-9	-1
-10	-1/2
-11	-1/3
-7	1
-6	1/2
-5	1/3



$$\textcircled{22} f(x) = \frac{x^2 - 7x + 10}{x - 5} \rightarrow \frac{(x-5)(x-2)}{x-5}$$

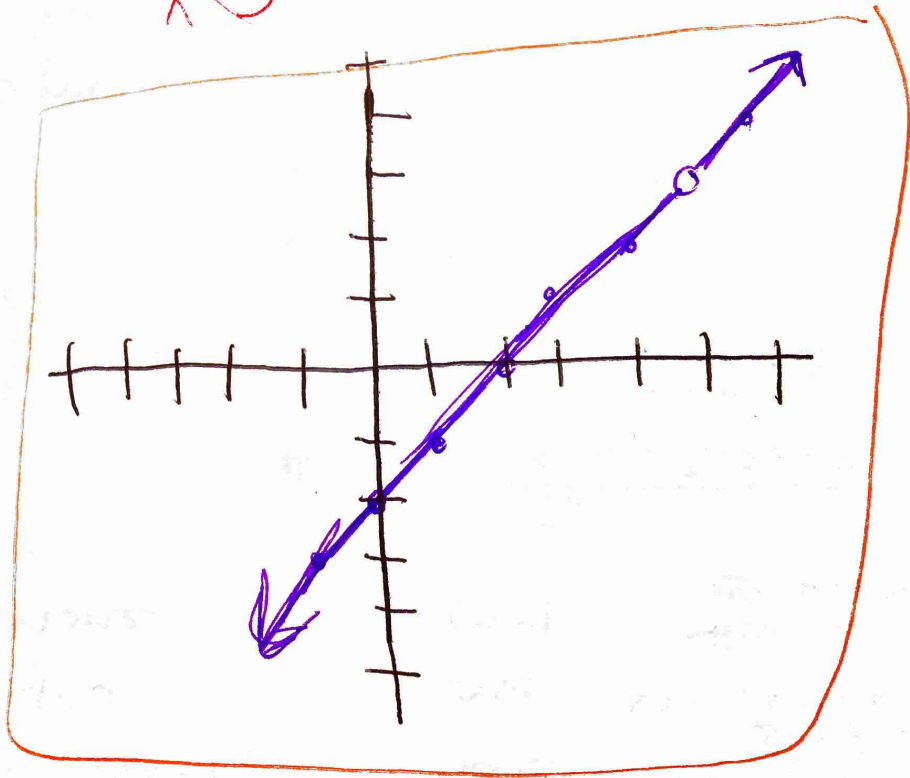
VA: none

HA: none

hole: $x = 5$

this is the line $y = x - 2$ with a hole

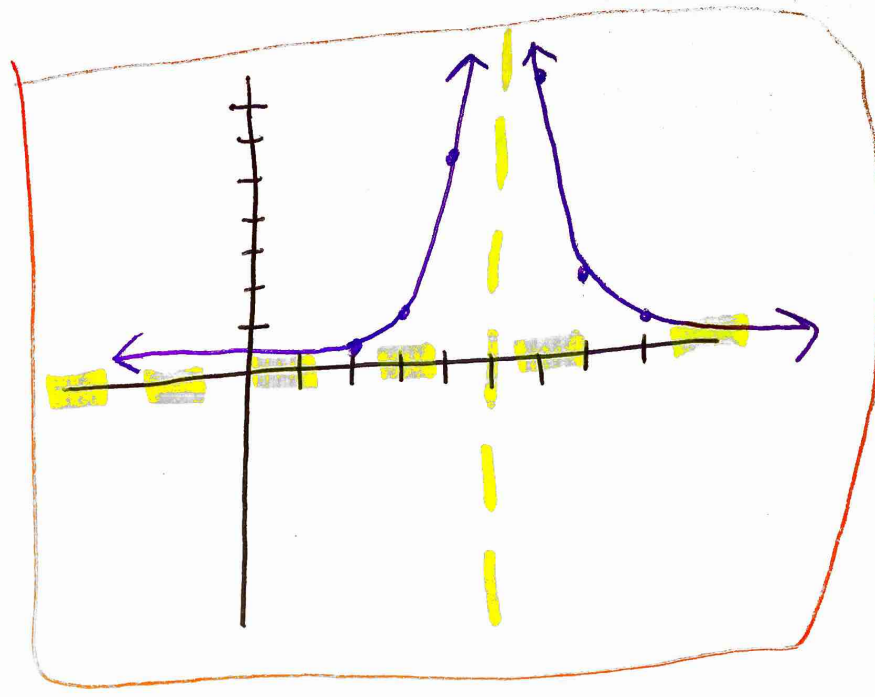
x	y
-1	-3
0	-2
1	-1
2	0
3	1



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

VA: $x=5$
 HA: $y=0$
 hole: none

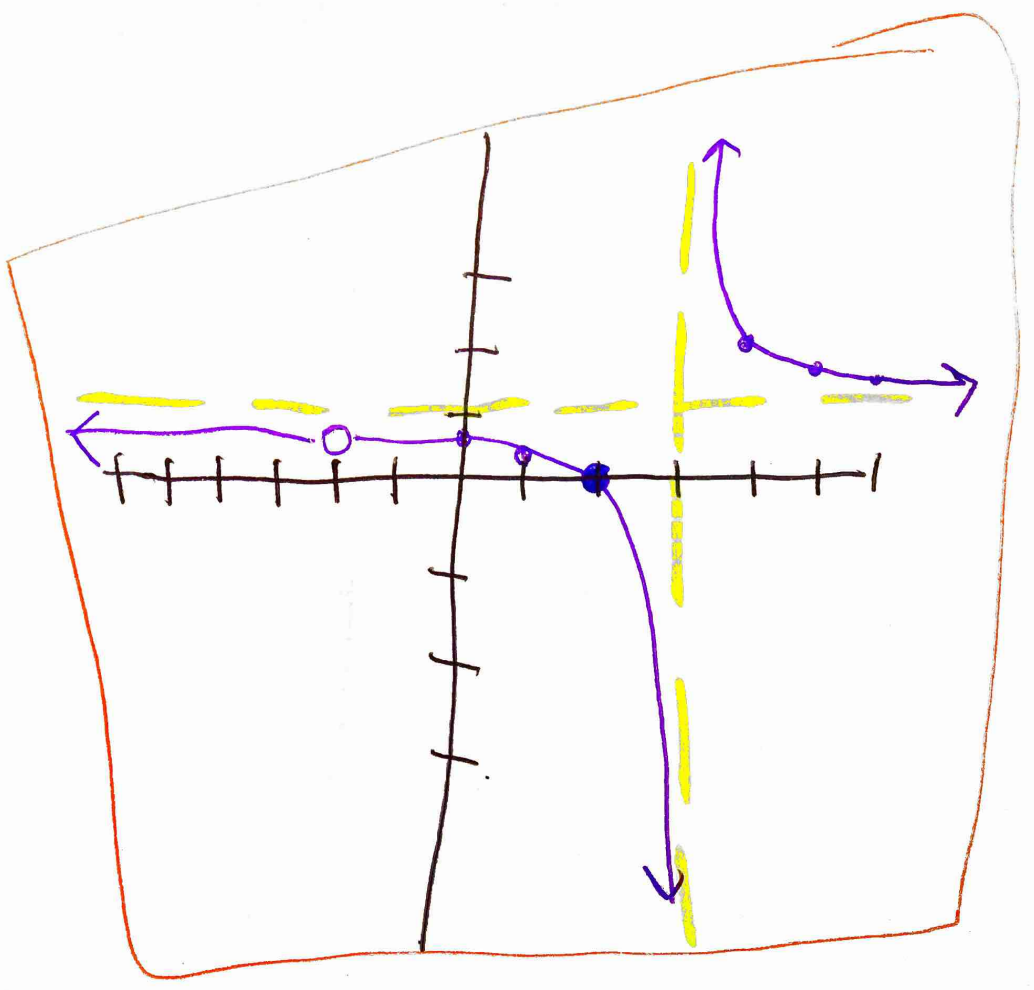
x	y
4	5
3	1
2	$\frac{1}{3}$
6	7
7	2
8	1



25) $g(x) = \frac{x^2 - 4}{x^2 - x - 6} \rightarrow \frac{(x-2)(x+2)}{(x-3)(x+2)}$

VA: $x=3$
 HA: $y=1$
 hole: $x=-2$

x	y
2	0
1	$\frac{1}{2}$
0	$\frac{2}{3}$
4	2
5	$\frac{3}{2} \Rightarrow 1.5$
6	$\frac{4}{3} \Rightarrow 1.33$



$$f(x) = \frac{2x^2 + 5x - 3}{x^2 + x - 20} \Rightarrow \frac{(2x-1)(x+3)}{(x+5)(x-4)}$$

VA: $x = -5, x = 4$

HA: $y = 2$

ole: none

x	y
6	3.9
7	2.7
8	2.4
4	-1.1
3	0
2	.28
1	.3
0	.15
	-.22
	-1
	-3.75
	7.2
	4.5
	3.6

