2.) $y = \dfrac{(x+2)(x-2)}{2x(x-2)(x+2)} = \dfrac{\cancel{x+2}}{2x(\cancel{x+2})}$

2a) domain

$\{x \mid x \neq 0, 2, -2\}$

Hole

$(2, \frac{1}{4})$

Hole

$(-2, -\frac{1}{4})$

4.) $x^3 - 1 \overline{)\, x^4 + 0x^3 + 2x^2 + 0x + 0}$ $\quad y = x$

$\underline{-x^4}\qquad\qquad + x$

$\qquad\qquad\qquad\quad x$

4.) $\dfrac{x^2(x^2+2)}{(x-1)(x^2+x+1)}$

$x = 0$ $\quad (0,0)$

6. $f(x) = \dfrac{x^3 - 4x^2 - 4x + 16}{x^3 - 5x^2 + 4x}$

$= \dfrac{(x-4)(x-2)(x+2)}{x(x-4)(x-1)}$

$(4, 1)$ $\qquad \dfrac{(2)(6)}{4(3)}$

16.)

$$y = \frac{(2x-1)(x-7)}{x(x^2-10x+21)}$$

$$y = \frac{2x^2-15x+7}{x^3-10x^2+21x}$$

4.) $y = \dfrac{x^4+2x^2}{x^3-1} = \dfrac{x^2(x^2+2)}{(x-1)(x^2+x+1)}$

VA
$x=1$

SA $y = x$

$$x^3-1 \;\overline{)\; x^4+0x^3+2x^2+0x+0}$$

$$-x^4 \qquad\qquad +x$$

$$2x^2+x$$

5.) $y = \dfrac{(x-8)(x+8)}{x-8} = x+8$

hole: $(8, 16)$

2.) $\dfrac{(3-2x)(3+2x)}{(2x-3)(3x+2)}$

$\dfrac{-(2x-3)(3+2x)}{(2x-3)(3x+2)}$

$-\dfrac{3+2x}{3x+2}$ $\quad$ $\dfrac{-3-2x}{3x+2}$

5.) $\dfrac{\cancel{7}^{1}x^{2}y^{3}}{\cancel{9}\cancel{3}_{1}} \cdot \dfrac{\cancel{15}^{5}y^{4}}{\cancel{4}x_{2}} \cdot \dfrac{\cancel{6}^{2}xy^{1}}{\cancel{35}_{5}}$

$$\frac{x^{3}y^{8}}{2x} = \frac{x^{2}y^{8}}{2}$$

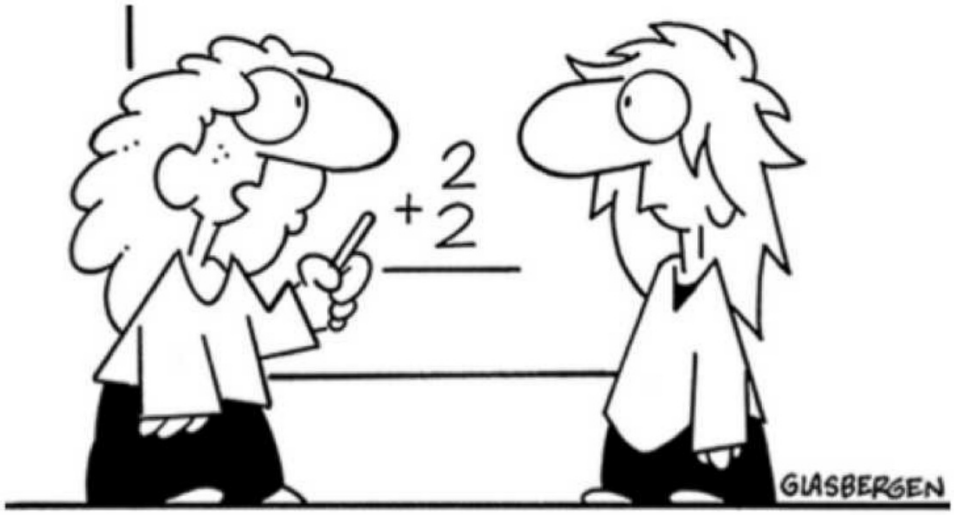
7.) $\dfrac{x^2 \cdot x + \frac{1}{x^2} \cdot x^2}{x^2 \cdot 1 + \frac{1}{x} \cdot x^2}$ $\dfrac{x^3+1}{x^2+x}$

$\dfrac{(x+1)(x^2-x+1)}{x(x+1)}$ $\dfrac{0}{4}$

5.) $\frac{\cancel{7}x^2y^4}{\cancel{3}\cancel{9}y} \cdot \frac{\cancel{15}y^5}{\cancel{4}xy^{\cancel{2}}} \cdot \frac{\cancel{6}xy}{\cancel{35}\cancel{5}1}$ $\frac{1}{2}+\frac{1}{8}$

$$\frac{x^3y^{10}}{2xy^3} = \frac{x^2y^7}{2}$$

5.3 Graphs of Rational Functions - cont.



"First they build up your confidence with simple addition and subtraction, then they slam you with algebra and calculus. It's quite a clever scheme."

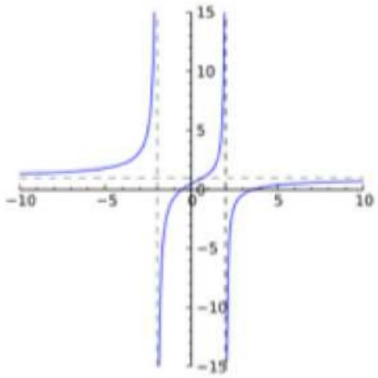
*See printout.

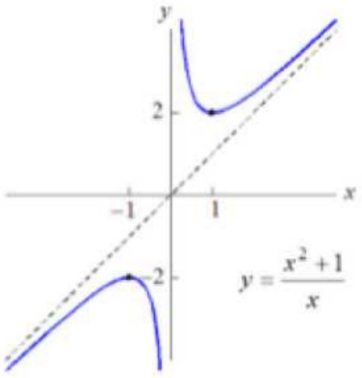
HW:

Sketching Requirements:

- x-intercepts
- y-intercept
- asymptotes
- holes
- plot at least one point per "piece"

Number of VA and the Number of "Pieces"





Number of Vertical Asymptotes	Number of "Pieces"
0	1
1	2
2	3
n	n + 1

ex: Sketch and state the domain, range and end behavior.

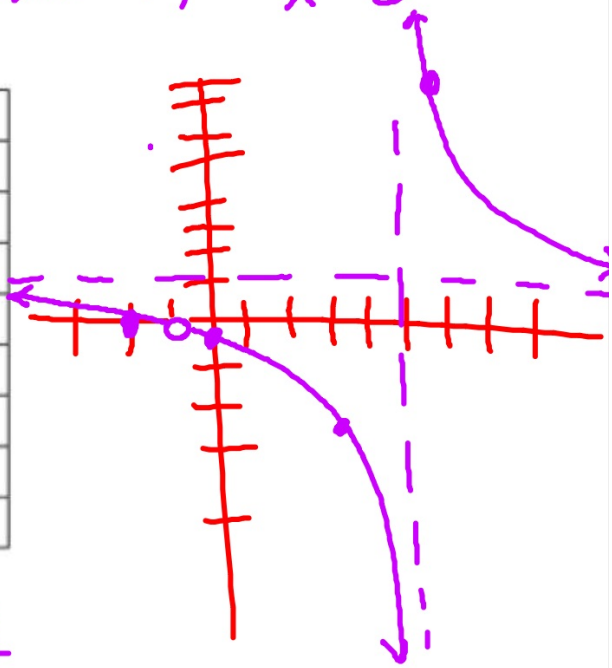
a) $f(x)=\dfrac{x^2+3x+2}{x^2-4x-5}=\dfrac{(x+2)(x+1)}{(x-5)(x+1)}=\dfrac{x+2}{x-5}$

x-int	$x=-2$
y-int	$y=-2/5$
VA	$x=5$
HA	$y=1$
SA	none
Holes	$(-1,-1/6)$
Domain	$\{x \mid x \neq 5,-1\}$
Range	$\{y \mid y \neq 1,-1/6\}$
End Behavior	

$x \to -\infty \quad y \to 1$

$x \to \infty \quad y \to 1$

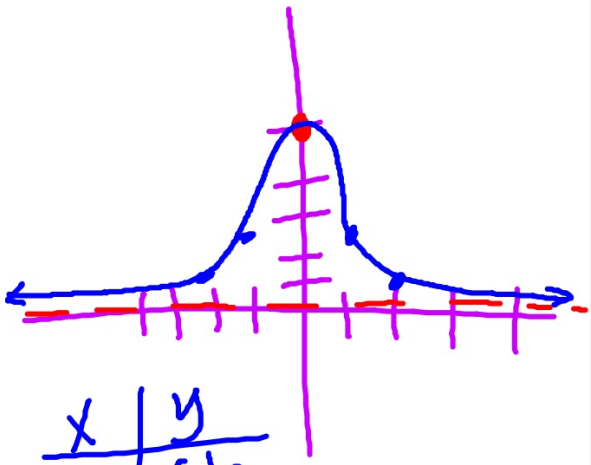
x	y
3	$-5/2$
6	8



ex: Sketch and state the domain, range and end behavior.

b) $f(x)=\dfrac{5}{x^2+1}$

x-int	none
y-int	(0, 5)
VA	none
HA	$y=0$
SA	none
Holes	none
Domain	$\{x \mid x \in R\}$
Range	$\{y \mid 0 < y \leq 5\}$
End Behavior	$x \to -\infty \quad y \to 0$ $x \to \infty \quad y \to 0$



x	y
1	5/2
2	1
-1	5/2
-2	1

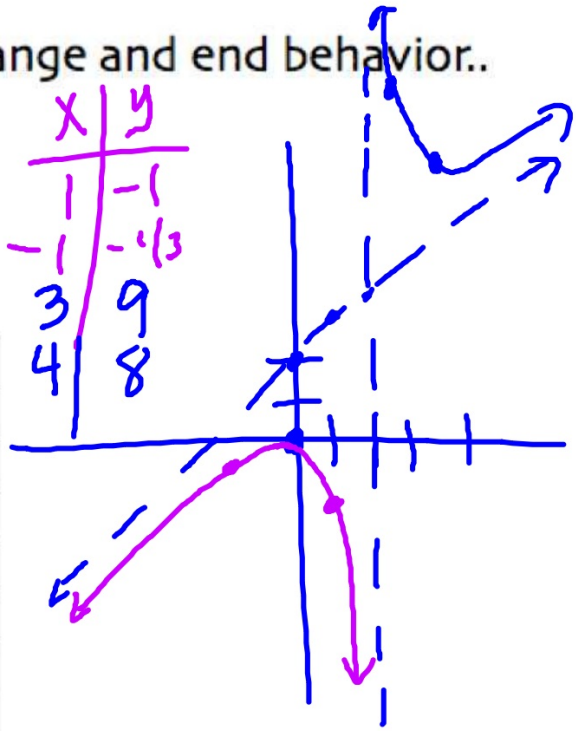
ex: Sketch and state the domain, range and end behavior..

c) $y = \dfrac{x^2}{x-2}$

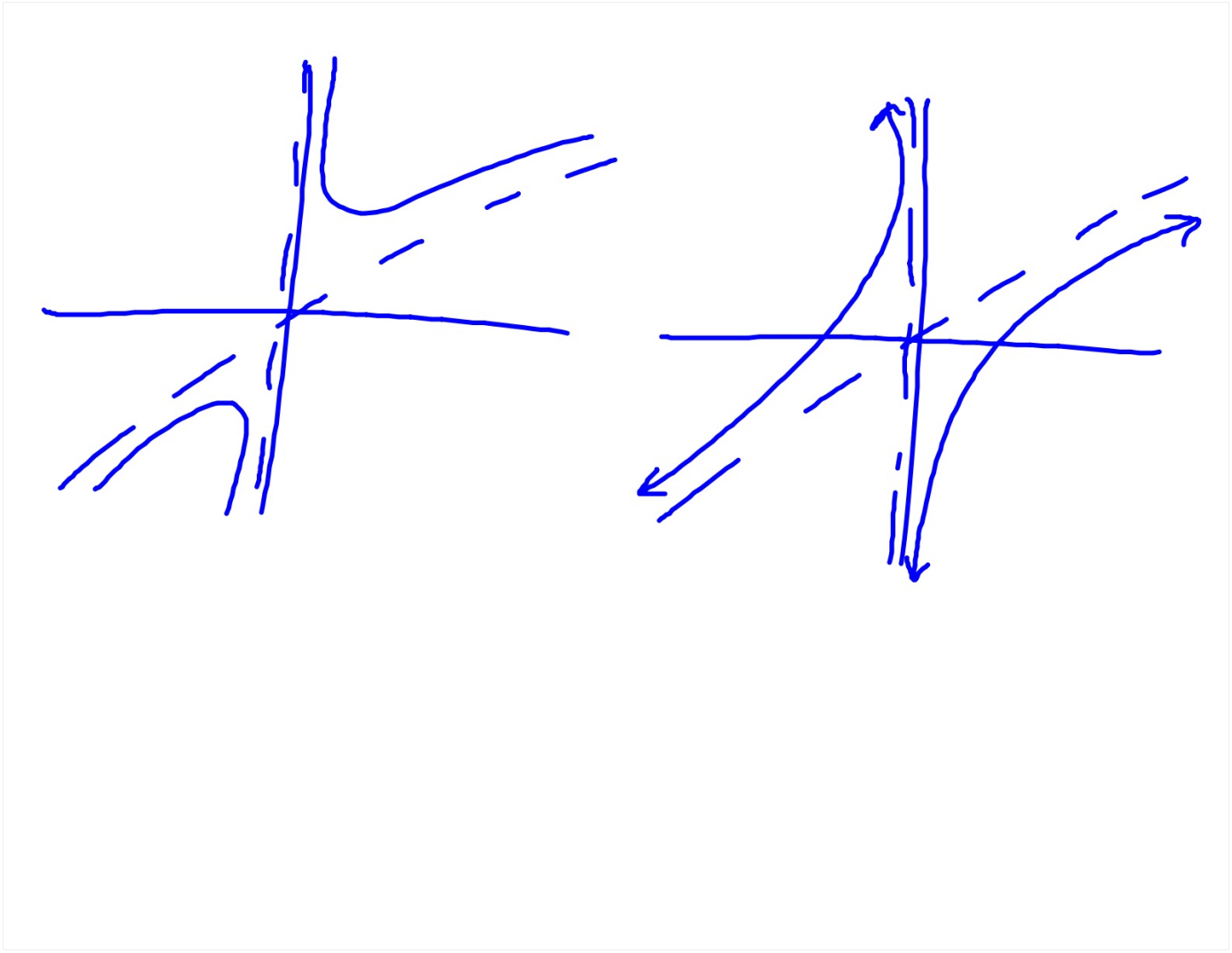
$$2 \mid 1 \quad 0 \quad 0$$
$$\qquad\quad 2 \quad 4$$
$$\qquad 1 \quad 2 \quad \not{4}$$

$y = x + 2$

x	y
1	-1
-1	-1/3
3	9
4	8



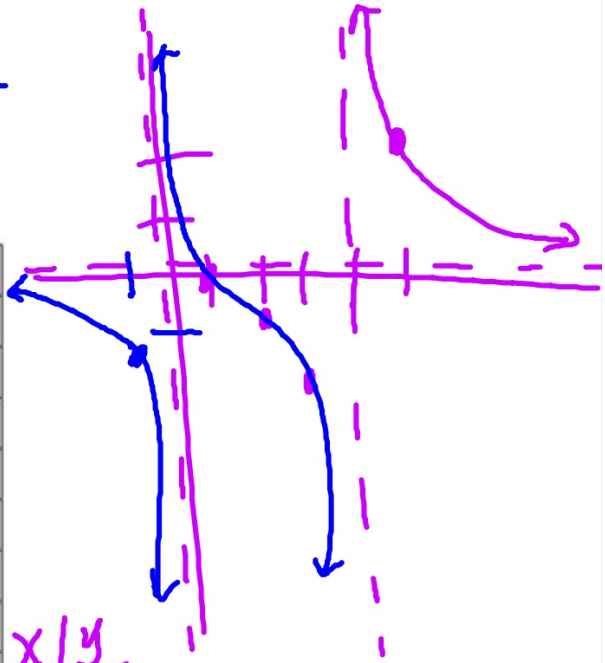
x-int	(0,0)
y-int	(0,0)
VA	$x = 2$
HA	none
SA	$y = x + 2$
Holes	none
Domain	$\{x \mid x \neq 2\}$
Range	SKIP
End Behavior	$x \to -\infty \quad y \to -\infty$
	$x \to \infty \quad y \to \infty$



ex: Sketch and state the domain, range and end behavior..

d) $y = \dfrac{3x-3}{x^2-4x} = \dfrac{3(x-1)}{x(x-4)}$

x-int	(1, 0)
y-int	none
VA	$x=0, x=4$
HA	$y=0$
SA	none
Holes	none
Domain	$\{x \mid x \neq 0,4\}$
Range	$\{y \mid y \in R\}$
End Behavior	$x \to -\infty \; y \to 0$ $x \to \infty \; y \to 0$



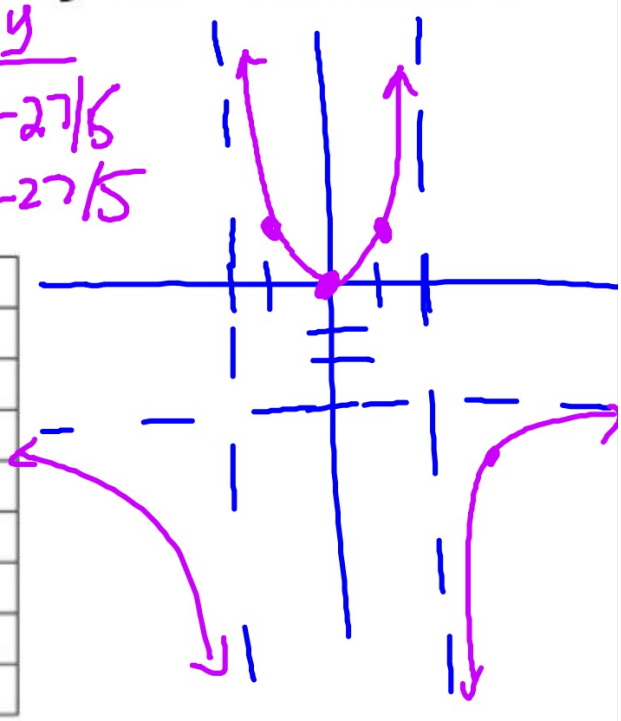
x	y
-1	5
-6	5
5	5
12	5
2	-4
3	-3
6	-3

ex: Sketch and state the domain, range and end behavior..

e) $f(x) = \dfrac{-3x^2}{x^2 - 4}$

x	y
3	-27/5
-3	-27/5

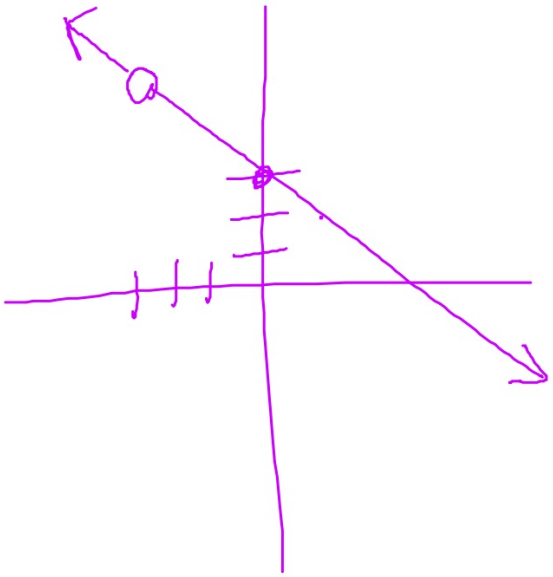
x-int	(0,0)
y-int	(0,0)
VA	$x = \pm 2$
HA	$y = -3$
SA	none
Holes	none
Domain	$\{x \mid x \neq 2, -2\}$
Range	$\{y \mid y \geq 0, y < -3\}$
End Behavior	$x \to -\infty \quad y \to -3$ $x \to \infty \quad y \to -3$



ex: Sketch and state the domain, range and end behavior..

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

x-int	$(3,0)$
y-int	$(0,3)$
VA	none
HA	none
SA	none
Holes	$(-3,6)$
Domain	$\{x \mid x \neq -3\}$
Range	$\{y \mid y \neq 6\}$
End Behavior	$x\to-\infty$ $y\to\infty$ $x\to\infty$ $y\to-\infty$



ex: State the end behavior.

a) $f(x)=\dfrac{x^2+3x+2}{x^2-4x-5}$

ex: State the end behavior.

b) $y = \dfrac{x^2}{x-2}$

ex: State the end behavior.

c)