

Name: _____

Date: _____

PCH: Graphing Rational Functions

Sketch the graph of each rational function. Label all holes and intercepts with their coordinates and any and all asymptotes with their equations. Remember to gather all pertinent information that we discussed in our chart work. Then state the domain of each.

Do Now: From Friday's sheet

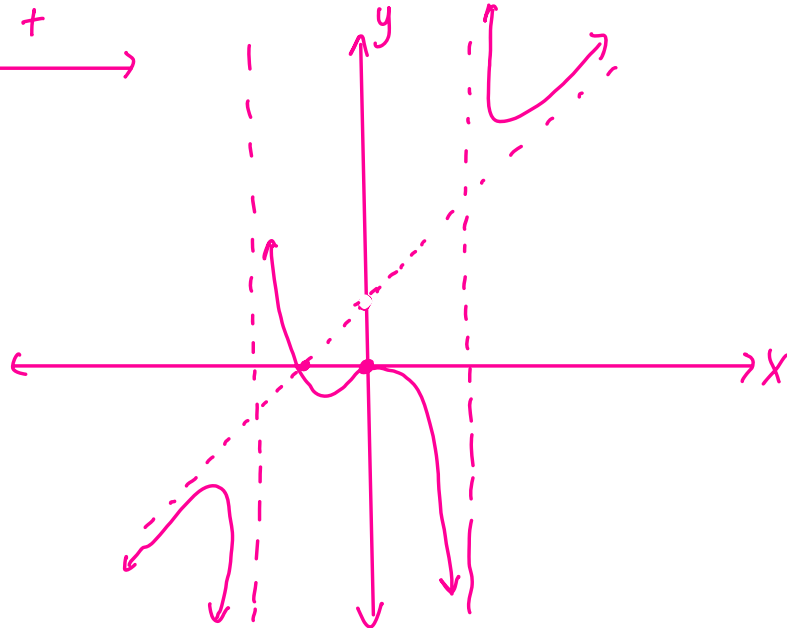
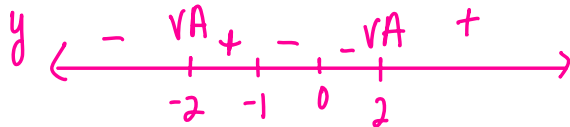
$$13. y = \frac{x^3 + x^2}{x^2 - 4} = \frac{x^2(x+1)}{(x-2)(x+2)}$$

no holes
VA: $x = \pm 2$
HA: none
OA: $y = x + 1$
Cross? $(-1, 0)$
X-int: $(0, 0), (-1, 0)$
Y-int: $(0, 0)$
neither

$$\begin{array}{r|rr|rr} 0 & 1 & 1 & 0 & 0 & \text{remainder} \\ 4 & & 0 & 0 & 0 & \\ \hline & 1 & 1 & 4 & 4 & \end{array}$$

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

$$\begin{aligned} x^3 + x^2 &= x^2 + x^2 - 4x - 4 \\ 0 &= -4x - 4 \\ 4x &= -4 \\ x &= -1 \end{aligned}$$

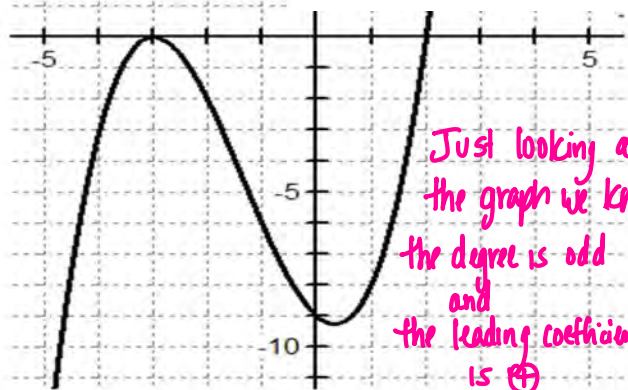


$$D: \{x | x \neq \pm 2\}$$

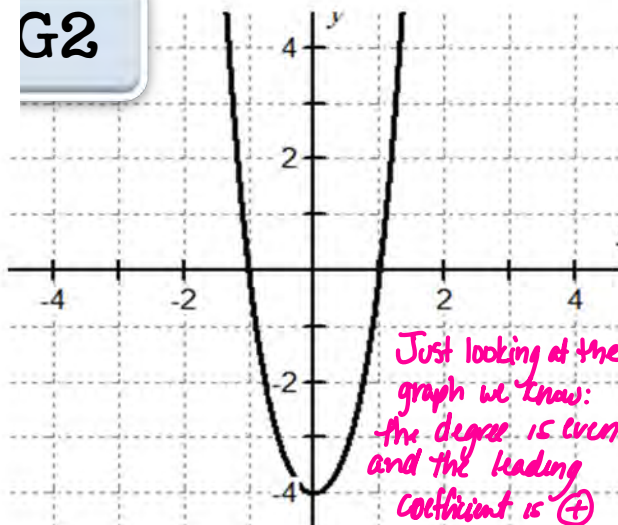
G1

Graphs of Polynomial Functions: End behavior

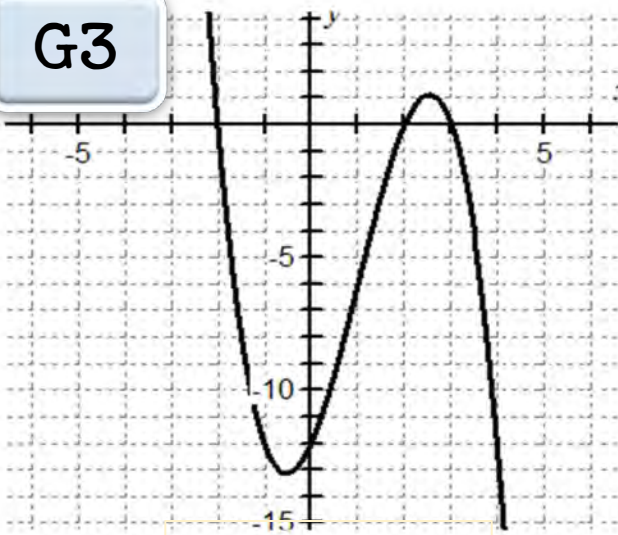
Sign of Leading Coefficient	Odd degree		Even degree	
	Positive	Negative	Positive	Negative
End behavior				



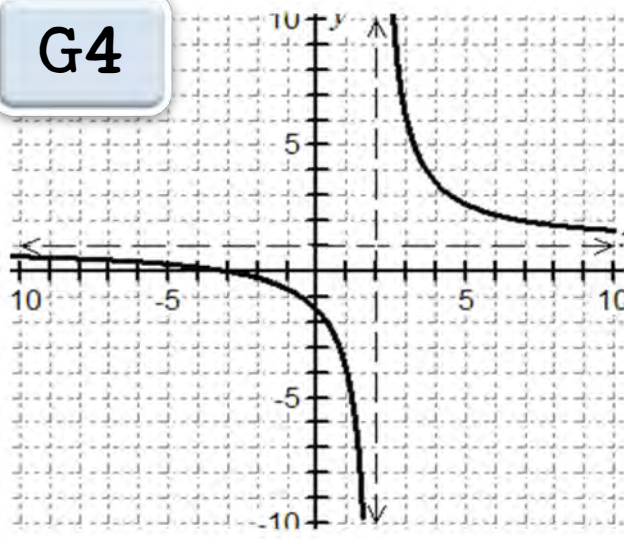
G2



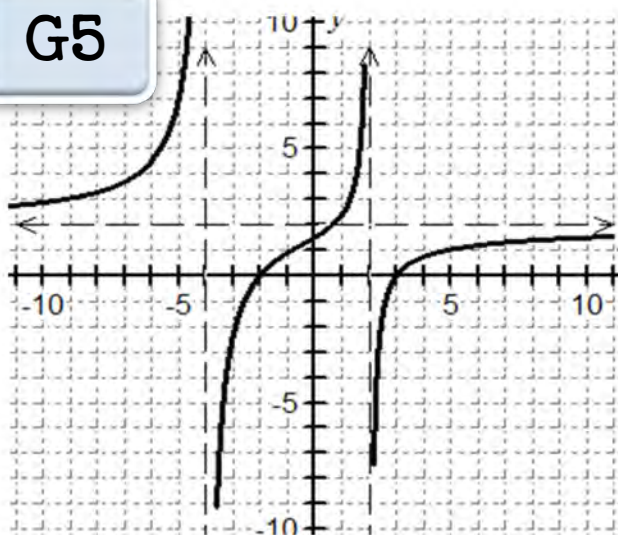
G3



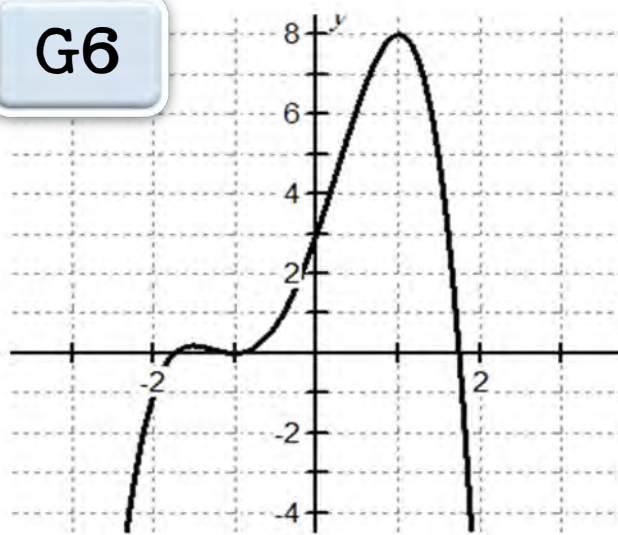
G4



G5



G6



Homework 12-15

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

no holes

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

HA: $y = 1$

intersect? NO

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

$2x \neq 2x-1$

x -int: $(0,0)$

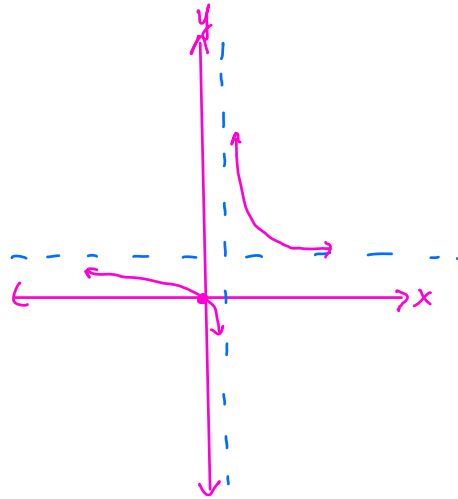
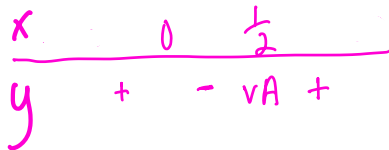
$0 = \frac{2x}{2x-1}$

$2x = 0$

$x = 0$

y -int: $(0,0)$

$y = \frac{2(-x)}{2(-x)-1}$ neither



$D: \{x \neq \frac{1}{2}\}$

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

no holes

VA: $x = \pm 1$

HA: $y = 1$

intersect? NO

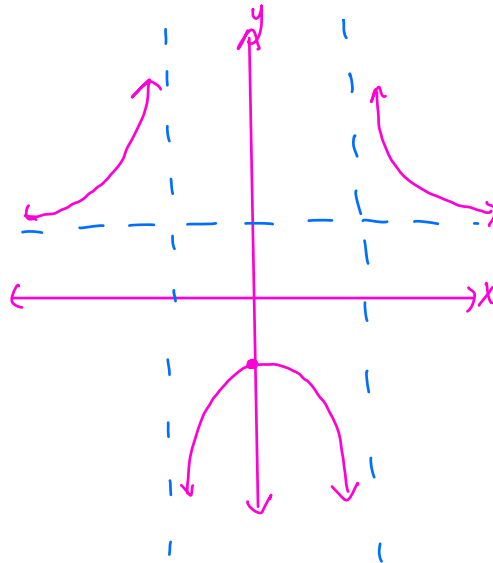
$1 = \frac{x^2+1}{x^2-1}$

$x^2-1 \neq x^2+1$

x -int: none

y -int: $(0,-1)$

$y = \frac{(-x)^2+1}{(-x)^2-1}$ even



$D: \{x \neq \pm 1\}$

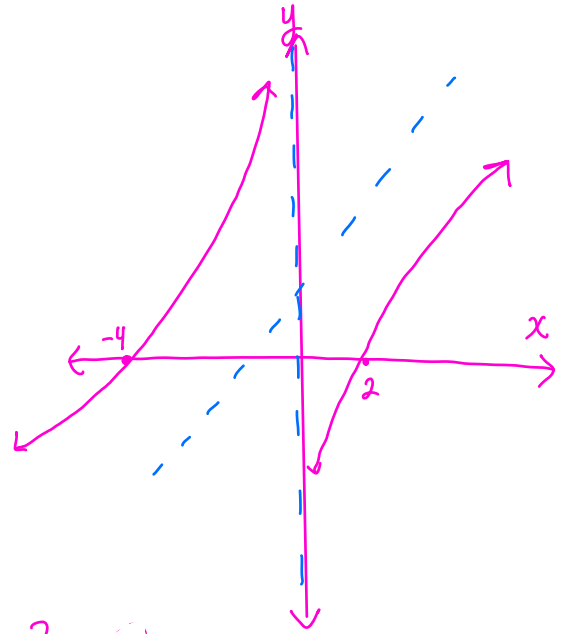
5. $y = \frac{(x+4)(x-2)}{x^2+2x-8}$
 $y = \frac{(x+4)(x-2)}{x}$

no holes
 VA: $x=0$
 HA: none
 OA: $y=x+2$

x-int: $(-4, 0), (2, 0)$

y-int: none

$y = \frac{(-x)^2 + 2(-x) - 8}{-x}$
 neither



$$\begin{array}{r} x+2 \\ x \overline{) x^2+2x-8} \\ \underline{x^2} \\ 2x \\ \underline{2x} \\ -8 \end{array}$$

intersect? No

$x+2 = \frac{x^2+2x-8}{x}$

$x^2+2x \neq x^2+2x-8$

x:	-4	0	2	∞
y:	-	0	+	-

$D: \{x \mid x \neq 0\}$

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

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

hole: $(-1, \frac{1}{3})$

VA: $x=2$

HA: $y=0$

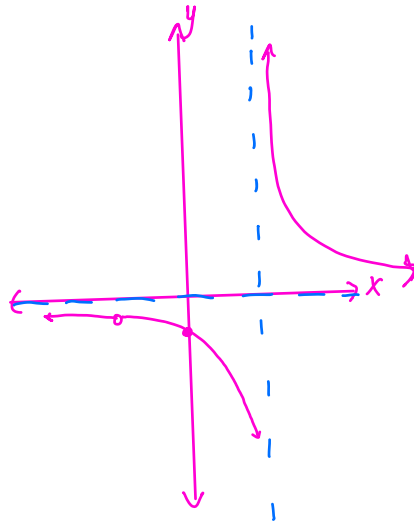
intersect? no

$0 = \frac{1}{x-2}$

$0 \neq 1$

x-int: none
 y-int: $(0, -\frac{1}{2})$

$y = \frac{1}{(-x)-2}$ neither



x	-	2	∞
y	-	VA	+

$\{x \mid x \neq -1, 2\}$

$$9. \quad y = \frac{(1-x)(1+x)}{x^2-9} = \frac{1-x^2}{(x-3)(x+3)}$$

no holes

VA: $x = \pm 3$

HA: $y = -1$

intersect? no

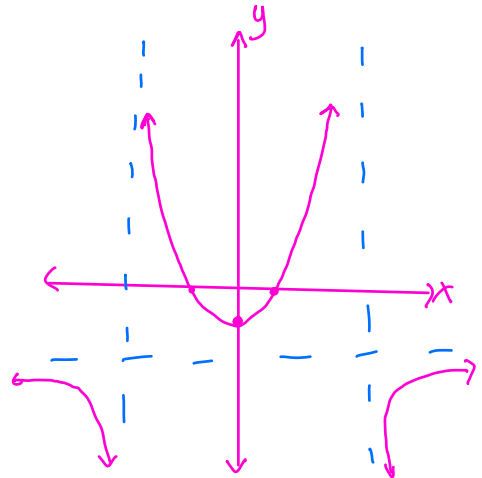
$$-1 = \frac{1-x^2}{x^2-9}$$

$$1-x^2 \neq x^2-9$$

x-int: $(\pm 1, 0)$

y-int: $(0, -\frac{1}{9})$

$$y = \frac{1-(-x)^2}{(-x)^2-9} \text{ even}$$



x	-3	-1	1	3	\dots
y	$-VA$	$+0$	-0	$+VA$	\dots

D: $\{x \mid x \neq \pm 3\}$

$$11. \quad y = \frac{5(x^2+1)}{x^2+4x+4} = \frac{5x^2+5}{(x+2)^2}$$

no holes

VA: $x = -2$

HA: $y = 5$

intersect? $(-\frac{3}{4}, 5)$

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

$$5x^2+20x+20 = 5x^2+5$$

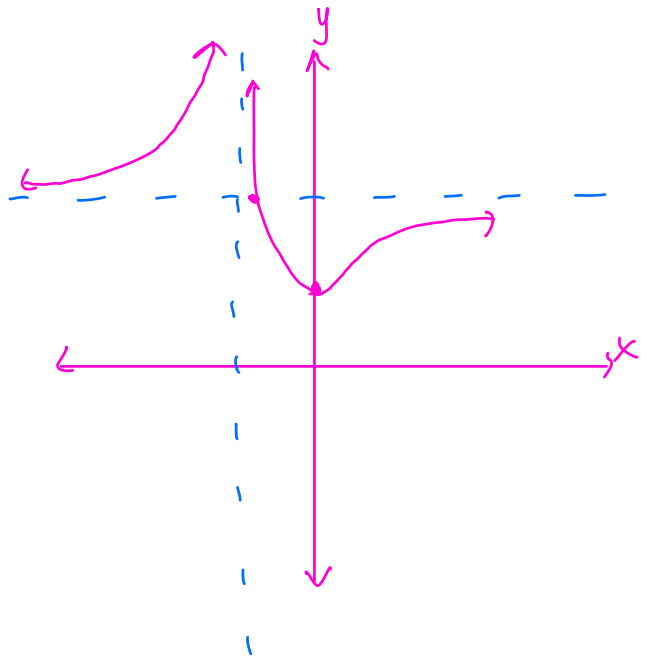
$$20x = -15$$

$$x = \frac{-15}{20} = -\frac{3}{4}$$

x-int: none

y-int: $(0, \frac{5}{4})$

$$y = \frac{5(-x)^2+5}{(-x)^2+4(-x)+4} \text{ neither}$$



x	-2	\dots
y	$+VA$	$+$

D: $\{x \mid x \neq -2\}$

Polynomial, Power, & Rational Functions Matching Activity

GRAPH	EQUATION	ZEROS	CHARACTERISTICS
G1	E10	Z4	C3
G2	E6	Z11	C1
G3	E12	Z1	C5
G4	E8	Z2	C10
G5	E4	Z3	C12
G6	E9	Z12	C2
G7	E1	Z10	C4
G8	E3	Z6	C11
G9	E11	Z7	C8
G10	E7	Z9	C6
G11	E5	Z5	C9
G12	E2	Z8	C7