

Today's Agenda:

- Finish 4.7
- Rational Functions Test Review (kahoot)
- Individual Reflection - turn in last 10 mins or so of class

4.7 Graphing Rational Functions

A Practice Understanding Task

Part I: Seeing Structure

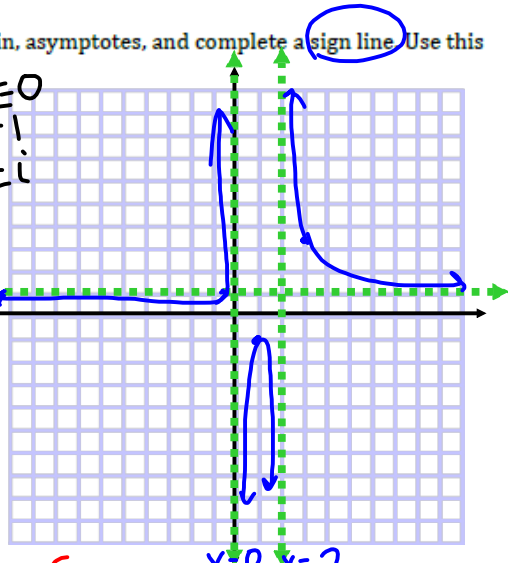
For each function, determine intercepts, domain, asymptotes, and complete a sign line. Use this information to sketch the graph.

1. $f(x) = \frac{x^2+1}{x(x-2)}$ $\frac{d2}{d3}$

$x^2+1=0 \Rightarrow \sqrt{x^2+1} = \pm i \Rightarrow x = \pm i$
 $x^2-2x \Rightarrow x^2+1$
 x^2-2x

VA: $x=0, 2$
 HA: $y = \frac{1}{1} = 1$
 Slant Asy: none

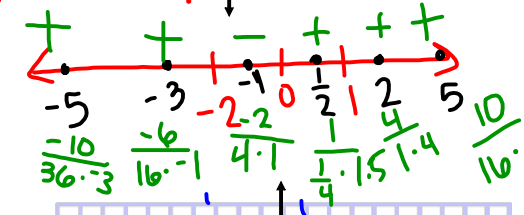
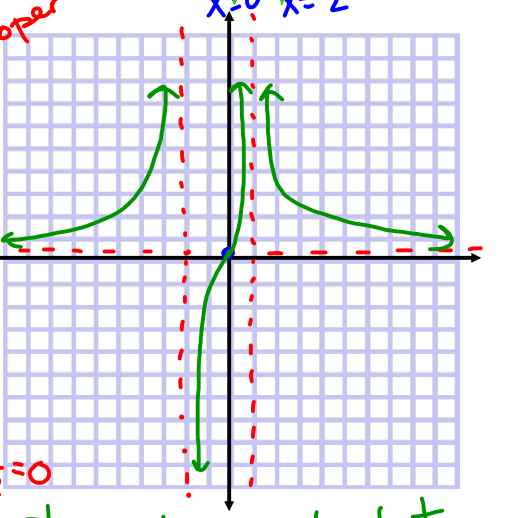
Sign line: $\frac{+}{-} \frac{-}{+} \frac{+}{-}$



2. $f(x) = \frac{2x}{(x-1)^2(x+2)}$ $\frac{d1}{d3}$ proper

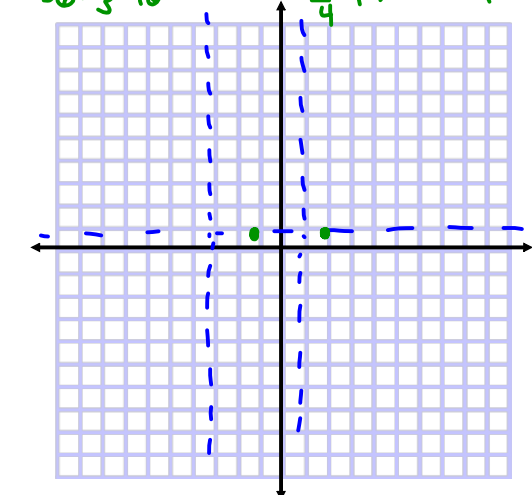
VA: $x=1, -2$
 HA: $y=0$ (x-axis)
 x-intercept: $x=0$
 y-intercept: $\frac{2 \cdot 0}{(0-1)^2(0+2)} = \frac{0}{(-1)^2(2)} = \frac{0}{2} = 0$

x-intercepts
vert. asymptotes

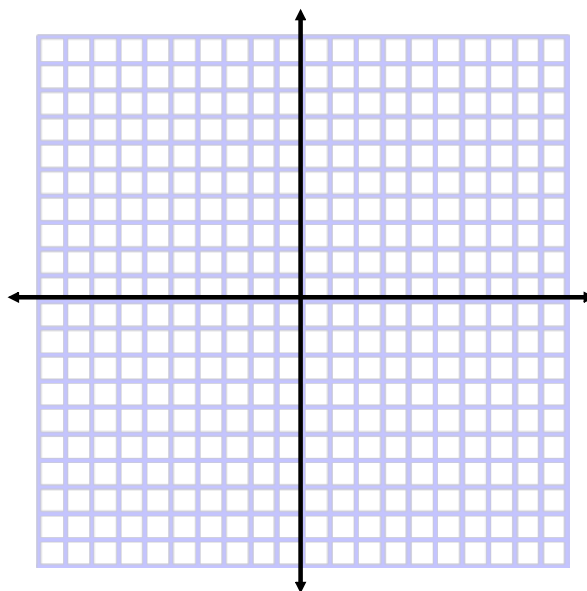


3. $f(x) = \frac{(x+1)(x-2)}{(x+3)^2(x-1)}$ $\frac{d2}{d3}$

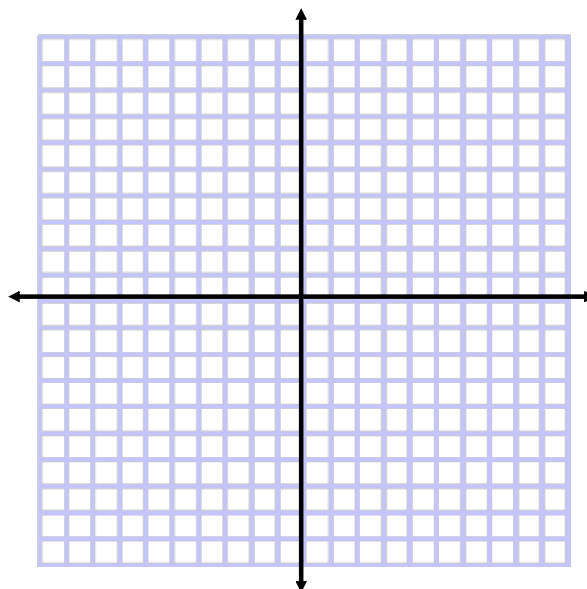
VA: $x=-3, 1$
 HA: $y=0$
 x-int: $x=-1, 2$



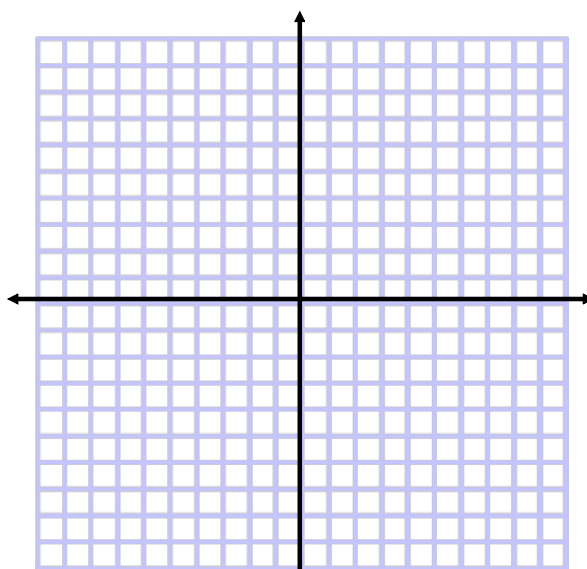
$$4. f(x) = \frac{(x-1)^2}{x^3+4x}$$



$$5. f(x) = \frac{3x^2}{x^2-9}$$



$$6. f(x) = \frac{2x^2-2x}{x^2+2x-3}$$

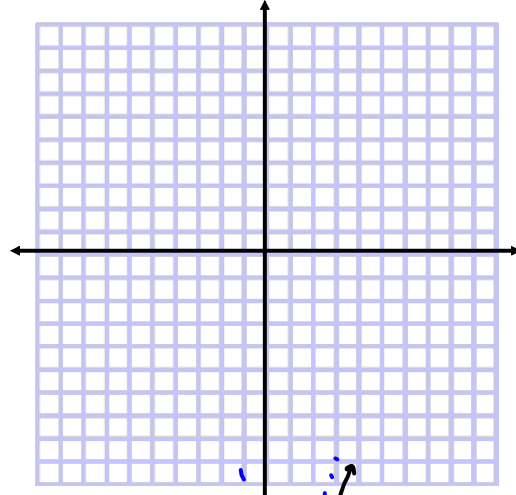


7. What observations do you notice about the various graphs from Part I?

Part II: Seeing More Structure

8. Determine the features and then sketch the graphs of the functions.

a. $f(x) = \frac{x}{x^2+1}$



b. $f(x) = \frac{2x(x-1)(x+2)}{(x+4)} \frac{d3}{d1}$

$\frac{2x}{x+4} = \frac{0}{2} = 0$
 $\frac{x}{x+4} = 0$

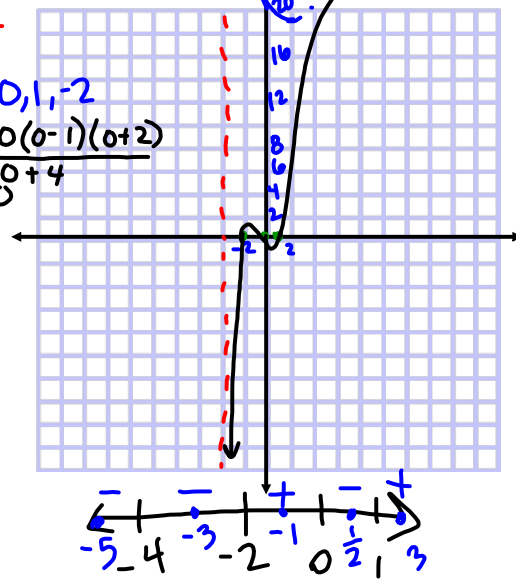
VA: $x = -4$
 HA: none
 SA: $2x^2 - 6x + 20$

$x\text{-int: } x = 0, 1, -2$
 $y\text{-int: } \frac{2 \cdot 0(0-1)(0+2)}{0+4} = 0$
 $y = 0^{0+4}$

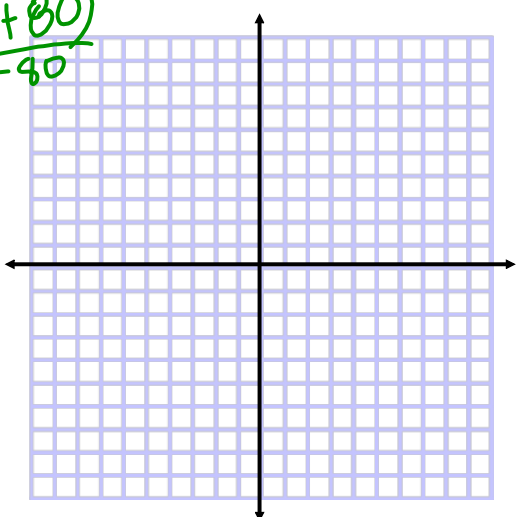
numerator

$(2x^2 - 2x)(x+2)$
 $2x^3 + 4x^2 - 2x^2 - 4x$
 $2x^3 + 2x^2 - 4x$

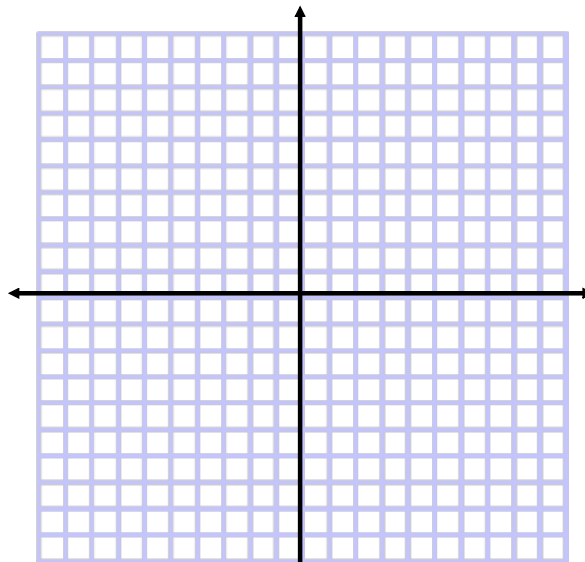
$\frac{2x^2 - 6x + 20}{x+4}$
 $x+4 \overline{) 2x^3 + 2x^2 - 4x + 0}$
 $\underline{-(2x^3 + 8x^2)}$
 $\quad -6x^2 - 4x + 0$
 $\quad \underline{-(-6x^2 - 24x)}$
 $\quad\quad 20x + 0$
 $\quad\quad \underline{-(20x + 80)}$
 $\quad\quad\quad -80$



c. $f(x) = \frac{(2x-1)(x+2)}{(x+3)(x-1)}$



d. $f(x) = \frac{3x(x+2)}{(x+3)(x-1)}$



d3

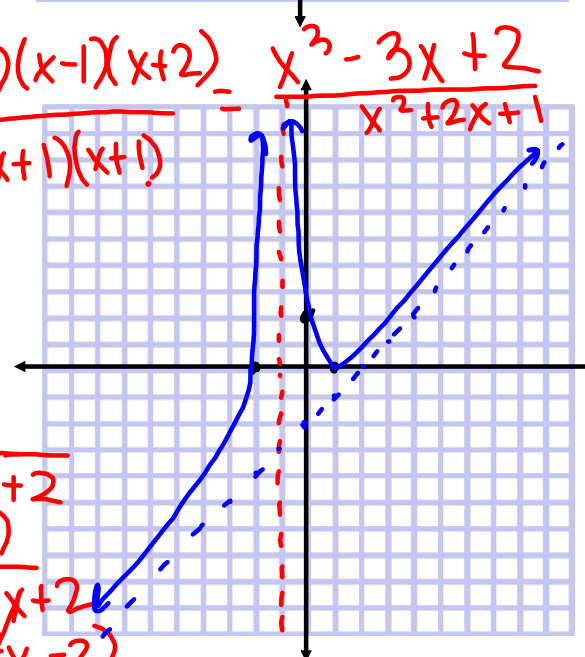
$f(x) = \frac{(x-1)^2(x+2)}{(x+1)^2}$

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

VA: $x = -1$

HA: none

SA: $y = x - 2$

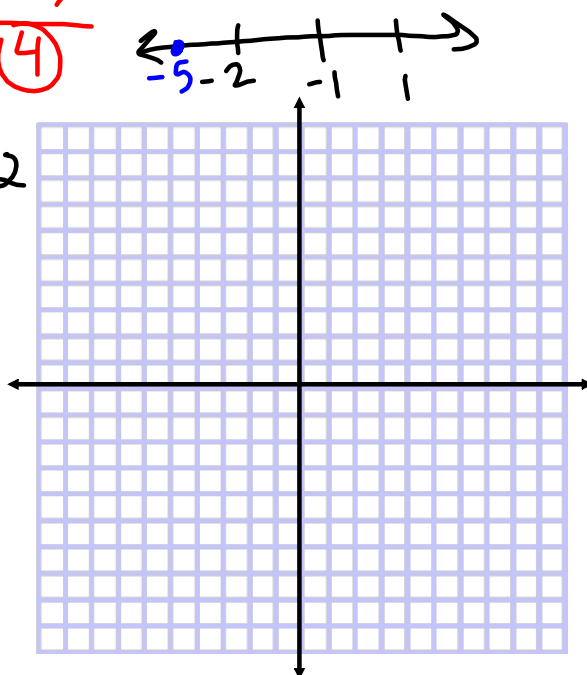


$$\begin{array}{r}
 \textcircled{x-2} \\
 x^2 + 2x + 1 \overline{) x^3 + 0x^2 - 3x + 2} \\
 \underline{-(x^3 + 2x^2 + x)} \\
 -2x^2 - 4x + 2 \\
 \underline{-(-2x^2 - 4x - 2)} \\
 4
 \end{array}$$

x-int: $x = 1, -2$

y-int: $y = \frac{-1 \cdot -1 \cdot 2}{1 \cdot 1} = \frac{2}{1} = 2$

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



4.7 HW

$x \neq 0, -2$

#1 $\frac{2 \cdot \cancel{x(x+2)}}{\cancel{(x+2)}} - \frac{\cancel{1} \cdot \cancel{x(x+2)}}{\cancel{x}} = \frac{\cancel{1}}{\cancel{x}} \cdot \cancel{x(x+2)}$

$$2x - (x+2) = x+2$$

$$2x - \cancel{x} - 2 = \cancel{x} + 2$$

$$-2 \neq 2$$

no solution