

Spiral Review

Divide using long division.

$$1.) \frac{x^2 - 1}{x + 1}$$

$$\begin{array}{r} x-1 \\ x+1 \overline{)x^2 + 0x - 1} \\ -x^2 -x \\ \hline -x + 1 \\ \hline 0 \end{array}$$

$$2.) \frac{2x^2 - 5x + 5}{x - 2}$$

$$\begin{array}{r} 2x - 1 + \frac{3}{x-2} \\ x-2 \overline{)2x^2 - 5x + 5} \\ -2x^2 + 4x \\ \hline -x + 5 \\ \hline +x + 2 \\ \hline 3 \end{array}$$

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

Find the following:

vertical asymptote- $x = -3, x = 3$

horizontal asymptote- $y = 0$

hole(s)- **none**

zero(s)- $x = 0 (0,0)$

domain- all real #'s except $-3, 3$

range- all real #'s except 0

y-intercept- $(0, 0)$

p.151 2.7 Graphs of Rational Functions

Guideline for graphing rational functions:

- 1.) **Simplify** function if possible (factor and cancel)
- 2.) Find and plot the **y-intercept**. Evaluate $f(0)$.
- 3.) Find any **zeros**. What makes numerator zero?
- 4.) Find any **asymptotes or holes**.
 - a.) vertical- what makes denominator zero?
 - b.) horizontal- compare exponents
 - c.) slant- use long division-
(dividend not including remainder)
 - d.) hole- what was cancelled out
- 5.) Sketch the asymptotes.
- 6.) Plot at least one point "between" and "beyond" each x-intercept and vertical asymptote.
- 7.) Use smooth curves to complete the graph.

Students will be able to find any asymptotes of the rational function and determine the domain.

Example 1: Determine its domain and identify any vertical or horizontal asymptotes.

a.) $f(x) = \frac{3-x}{2-x}$

VA: $x=2$

HA: $y=1$

Domain: all real #'s except 2

b.) $f(x) = \frac{x+4}{x^2+x-6} = \frac{x+4}{(x+3)(x-2)}$

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

HA: $y=0$

Domain: all real #'s except -3 and 2

Students will be able to sketch the rational function by hand. Check for intercepts, and asymptotes.

Example 2: Sketch the graph of the rational function by hand. Check for intercepts, and any asymptotes.

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

VA: $x=0$

HA: none

holes: none

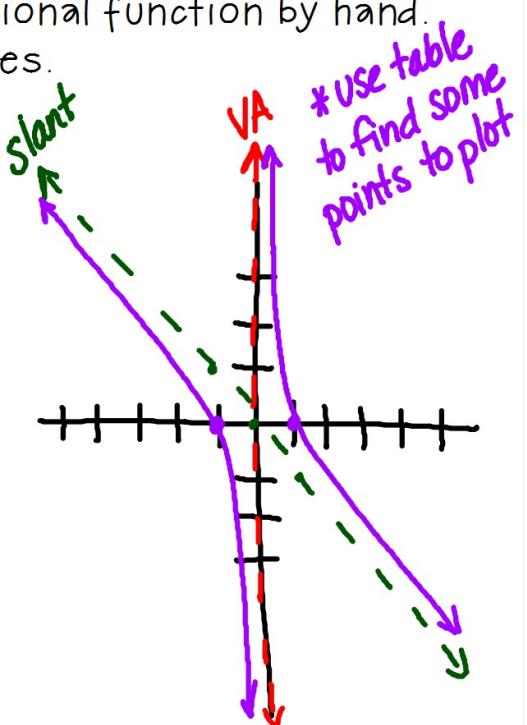
zeros: $x=1$ (1,0)
 $x=-1$ (-1,0)

y-int: none

Slant:

$$\begin{array}{r} -x + \frac{1}{x} \\ x \cancel{-x^2 + 0x + 1} \\ \hline 0x + 1 \end{array}$$

 $y = -x$



Students will be able to sketch the rational function by hand. Check for intercepts, and asymptotes.

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

VA: none

HA: none

Holes: none

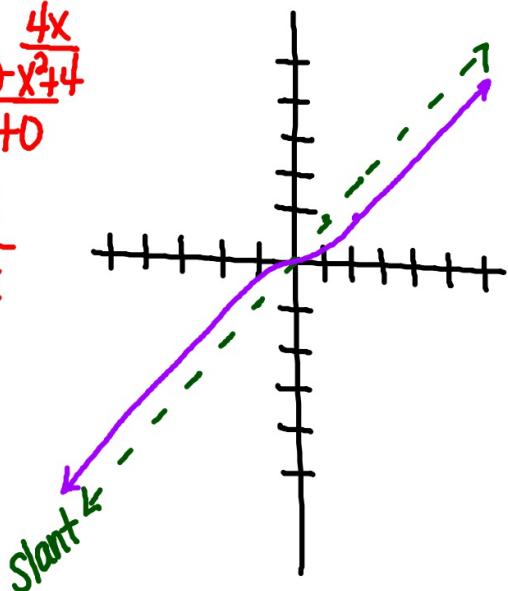
y-int: (0,0)

zeros: $x=0$ (0,0)

slant:

$$\begin{array}{r} 4x \\ (x+2)(x^2+4) \\ \hline x^3+4x \\ -x^3-4x \\ \hline -4x \end{array}$$

$y=x$



Students will be able to determine the domain of the function and identify any asymptotes.

Example 3: Determine the domain of the function and identify any asymptotes.

$$y = \frac{x^2 + 5x + 8}{x + 3}$$

VA: $x = -3$

HA: none

domain: all real #'s except -3

slant:

$$\begin{array}{r} 2 \\ (x+2)(x+3) \\ \hline x+3 \quad | \quad x^2 + 5x + 8 \\ -x^2 - 3x \\ \hline 2x + 8 \\ -2x - 6 \\ \hline 2 \end{array}$$

$y = x + 2$

Turn-in: worksheet from last class.

HW: p.157 (33-39, 49-55, 61, 63 odds)