

# 3.5 Graphing Rational Functions

Day 3 ①

## ① Vertical Asymptote(s)

Set denominator = 0, solve for x

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

$$\begin{array}{r} x-1=0 \\ +1 \quad +1 \\ \hline x=1 \end{array}$$

$$\begin{array}{r} x+1=0 \\ -1 \quad -1 \\ \hline x=-1 \end{array}$$

## ② Horizontal Asymptote

①  $\frac{x+1}{x^2-1}$

Degree Denominator greater than degree numerator.

$$y=0$$

②  $\frac{4x+1}{2x-4}$

Degrees Num + Denom. same.

$$y = \frac{4}{2}$$

$$y=2$$

## ③ Find y-intercept(s)

Set  $x=0$

ex:  $f(x) = \frac{x+2}{x+1}$       $f(0) = \frac{0+2}{0+1}$

y-intercept  $(0, 2)$

$$f(0) = 2$$

(4) Find x-intercept(s) Set  $y = 0$

ex:  $f(x) = \frac{x+2}{x+4}$

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

$$0(x+4) = x+2$$

$$\begin{array}{r} 0 = x+2 \\ -2 \quad \quad -2 \\ \hline \end{array}$$

$$-2 = x$$

$(-2, 0)$

x-intercept

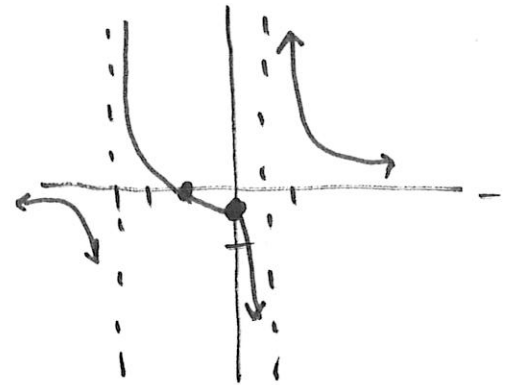
3.5 Ex 5  $f(x) = \frac{x+1}{2x^2+5x-3}$

Day 3

(2)

Graph

$x = -3$     $x = \frac{1}{2}$



(1) Vert. Asym

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

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

$$\begin{array}{r} x+3=0 \\ -3 \quad -3 \\ \hline x = -3 \end{array} \text{ VA}$$

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

(2) Hor. Asymptote

$$f(x) = \frac{x}{x^2} \rightarrow y = 0$$

(3) y-intercept set  $x=0$

$$f(0) = \frac{0+1}{2(0)+5(0)-3} = -\frac{1}{3}$$

$(0, -\frac{1}{3})$

(4) x-intercept set  $y=0$

$$0 = \frac{x+1}{2x^2+5x-3} \rightarrow \begin{array}{r} 0 = x+1 \\ -1 \quad -1 \\ \hline -1 = x \end{array}$$

$(-1, 0)$

3.5 Ex 6 Graph  $f(x) = \frac{2x+1}{x-3}$

(1) Vert Asym.  $x-3=0$   
 $+3+3$   
 $\hline x=3$

(2) Hor. Asym.  $f(x) = \frac{2x}{1x}$  degree same

$y = \frac{2}{1}$   $y=2$

(3) y-intercept set  $x=0$

$f(0) = \frac{2(0)+1}{0-3} = -\frac{1}{3} \rightarrow (0, -\frac{1}{3})$

(4) x-intercept set  $y=0$

$0 = \frac{2x+1}{x-3} \rightarrow \begin{array}{r} 0 = 2x+1 \\ -1 \qquad -1 \\ \hline -1 = 2x \\ \frac{-1}{2} = \frac{2x}{2} \end{array}$

$x = -\frac{1}{2} \rightarrow (-\frac{1}{2}, 0)$

