

2.2 day 2

End Behavior Functions

Ex 1) $y = \frac{x+2}{2x^2+x+7}$

$$\begin{array}{l} \text{H.A.} \\ n < m \\ y = 0 \end{array}$$

End Behavior Model
 $y = \frac{x}{2x^2}$ $y = \frac{1}{2x}$

Ex 2) $y = \frac{2x^2+7x-5}{5x^2+3x-1}$

$$\begin{array}{l} n = m \\ y = \frac{2}{5} \end{array}$$

$y = \frac{2x^2}{5x^2}$ $y = \frac{2}{5}$

Ex 3) $y = \frac{x^3+7x+1}{x-2}$

$$\begin{array}{l} n > m \\ \text{No H.A.} \\ y \rightarrow \infty \end{array}$$

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

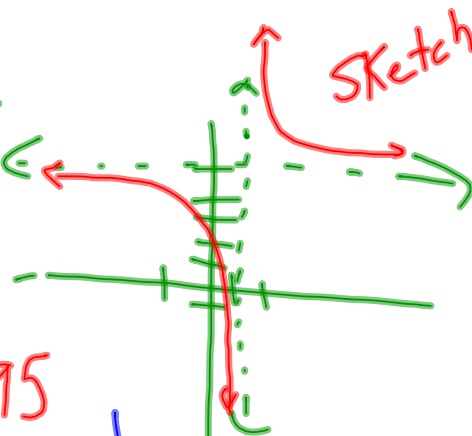
Ex 4) $y = \frac{5x}{x-1}$

V.A.:

$$x = 1$$

H.A.:

$$y = 5$$

VA

$$\lim_{x \rightarrow 1^-} f(x) = \frac{5(.99)}{.99-1} = -495$$

$$\lim_{x \rightarrow 1^+} f(x) = \frac{5(1.01)}{1.01-1} = 505$$

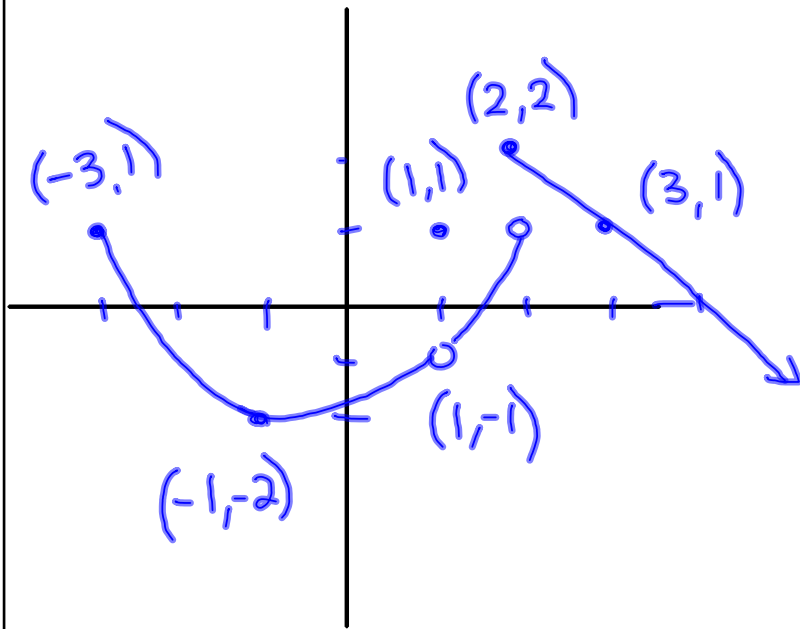
H.A.

$$\lim_{x \rightarrow \infty} f(x) = 5$$

$$\lim_{x \rightarrow -\infty} f(x) = 5$$

$f(x)$ is graphed below.

Ex 5) Find:



$$f(2) = 2$$

$$f(1) = 1$$

$$\lim_{x \rightarrow 2^+} f(x) = 2$$

$$\lim_{x \rightarrow 2^-} f(x) = 1$$

$$\lim_{x \rightarrow 2} f(x) = \text{No limit}$$

$$\lim_{x \rightarrow 1} f(x) = -1$$

$$\lim_{x \rightarrow -3} f(x) = 1$$

Ex 6)

$$f(x) = \begin{cases} 2x - 3 & x \leq 2 \\ x^2 + a & x > 2 \end{cases}$$

Find the value of a such $\lim_{x \rightarrow 2} f(x) = 1$

$$\lim_{x \rightarrow 2} 2x - 3 = 2(2) - 3 = 1$$

$$\lim_{x \rightarrow 2} (x^2 + a) = 1$$

$$\begin{aligned} x^2 + a &= 1 \\ 2^2 + a &= 1 \end{aligned}$$

$$a = -3$$

Ex 7) Given $y = \frac{ax + b}{x + c}$

Horizontal asym @ $y = -2$

Vertical asym @ $x = 4$

x-int @ $x = 1.5$

Find $a - b + c$.

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

$$-2 - 3 + -4$$

$$-9$$

zeros of the numerator

$$\begin{aligned} ax + b &= 0 \\ (-2)(1.5) + b &= 0 \\ -3 + b &= 0 \\ b &= 3 \end{aligned}$$

$$\lim_{x \rightarrow \infty} \frac{1 - \cos x}{x^2} = 0 \quad -1 \leq \cos x \leq 1$$

$$\begin{array}{c} +1 \quad +1 \quad +1 \\ 1 \geq -\cos x \geq -1 \\ \hline 2 \geq 1 - \cos x \geq 0 \end{array}$$

$$\frac{2}{x^2} \geq \frac{1 - \cos x}{x^2} \geq \frac{0}{x^2}$$

$$\lim_{x \rightarrow \infty} \frac{2}{x^2} \geq \lim_{x \rightarrow \infty} \frac{1 - \cos x}{x^2} \geq \lim_{x \rightarrow \infty} \frac{0}{x^2}$$

$$0 \geq 0 \geq 0$$