12.5 LIMITS AT INFINITY & INFINITE LIMITS

ESSENTIAL QUESTION

How do I use asymptotes to determine limits?

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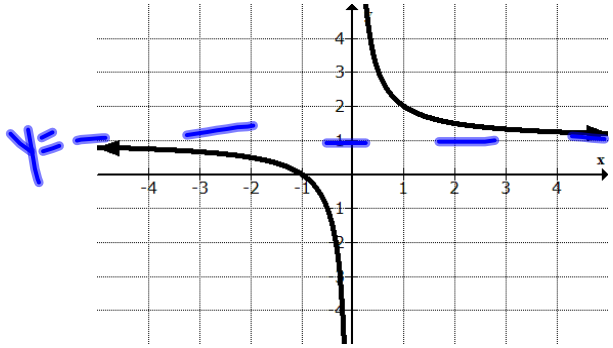
LIMITS AT INFINITY (end behavior - horiz. asymp)

$x \to \infty$



$y = -$

$\lim_{x \to \infty} = 1$

$\lim_{x \to -\infty} = 1$

12.5 LIMITS AT INFINITY & INFINITE LIMITS

ESSENTIAL QUESTION How do I use asymptotes to determine limits?

LIMITS AT INFINITY

ex. $\lim_{x\to\infty} \frac{1x^1}{2x^1-1} = \frac{1}{2}$

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

ex. $\lim_{x\to-\infty} \frac{x}{2x-1} = \frac{1}{2}$

Finding horizontal asymptotes:

degree (highest exponent) of the top over degree of the bottom

$\frac{same}{same}$ = name

$\frac{high}{low}$ no

$\frac{low}{high}$ $0 = y$

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LIMITS AT INFINITY

ex. $\lim_{x\to-\infty} \frac{5x^2+2}{x-2x^2} = -\frac{5}{2}$

same same

ex. $\lim_{x\to\infty} \frac{4x}{(x-1)(x+2)} = 0$

x2

low high 0=y

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LIMITS AT INFINITY

ex. Find the horizontal asymptote of $\frac{7x^1}{\sqrt{x^2+4}}$ $= \frac{7}{\pm 1}$ $y = \pm 7$

$\sqrt{x^2}$ = degree 1

x^1

same / same

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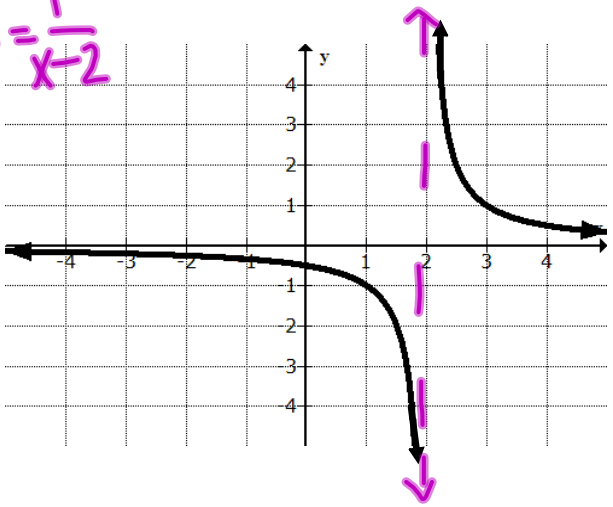
INFINITE LIMITS

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



$\lim_{x\to 2^+} = \infty$ RS

$\lim_{x\to 2^-} = -\infty$ LS

$\lim_{x\to 2}$ = DNE

12.5 LIMITS AT INFINITY & INFINITE LIMITS

ESSENTIAL QUESTION How do I use asymptotes to determine limits?

INFINITE LIMITS

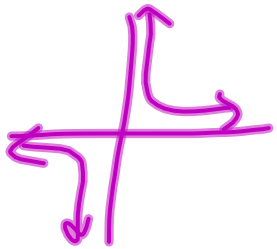
vertical asymptotes

ex. $\lim_{x \to 0^+} \frac{1}{x} = \infty$

Plug .1 $\frac{1}{.1}$ $\frac{+}{+}$ $+$

$\lim_{x \to 0^-} \frac{1}{x} = -\infty$

$-.1$ $\frac{1}{-.1}$ $\frac{+}{-}$ $-$



12.5 LIMITS AT INFINITY & INFINITE LIMITS

ESSENTIAL QUESTION How do I use asymptotes to determine limits?

INFINITE LIMITS

ex. $\lim_{x\to 2^-} \frac{-3}{x-2} = \infty$

VA

LS

$1.9 \quad \frac{-3}{1.9-2} = \frac{-}{-} = +$

ex. $\lim_{x\to 5^-} \frac{-4}{(x-5)^2} = -\infty$

VA

LS

$4.9 \quad \frac{-4}{(4.9-5)^2} \quad \frac{-}{(-)^2} = \frac{-}{+}$