

2.2 Limits involving Infinity

Use the table on your calculator to investigate the limit numerically:

$$\lim_{x \rightarrow \infty} \frac{1}{x} =$$

$$\lim_{x \rightarrow -\infty} \frac{1}{x} =$$

Sep 1-8:31 AM

Definition of a Horizontal Asymptote:

$$\text{If } \lim_{x \rightarrow \infty} f(x) = b \quad \text{or} \quad \lim_{x \rightarrow -\infty} f(x) = b \quad \text{then there is a HA at } y = b$$

Find the horizontal asymptotes:

$$f(x) = \frac{\sin x}{x}$$

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

Aug 15-8:38 PM

Estimate: (remember this includes both the left and right hand limits!)

$$\lim_{x \rightarrow 0} \frac{1}{x} =$$

Aug 30-9:19 AM

Definition of a Vertical Asymptote:

$$\lim_{x \rightarrow a^+} f(x) = \pm\infty$$

or

$$\lim_{x \rightarrow a^-} f(x) = \pm\infty$$

then there is a VA at $x = a$

Find the vertical asymptotes:

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

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

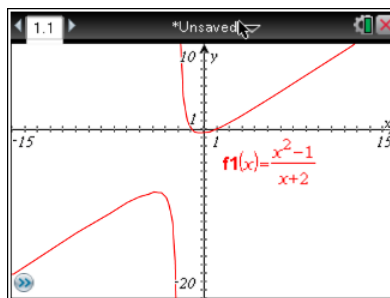
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End Behavior Models:

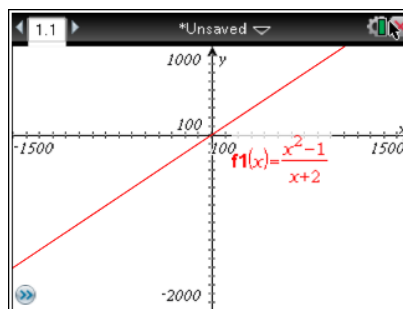
$$f(x) = \frac{x^2 + 1}{x + 2}$$

Graph $f(x)$ using the following windows:

$[-15, 15]$ $[-20, 10]$



$[-1500, 1500]$ $[-2000, 1000]$



what is an end-behavior model for $f(x)$:

Sep 1-8:27 AM

Find the end behavior models:

$$y = \frac{2x^5 + x^4 - x^2 + 1}{3x^2 - 5x + 7}$$

$$y = \frac{x + 1}{3x^2 - 4x + 5}$$

Aug 30-9:26 AM