

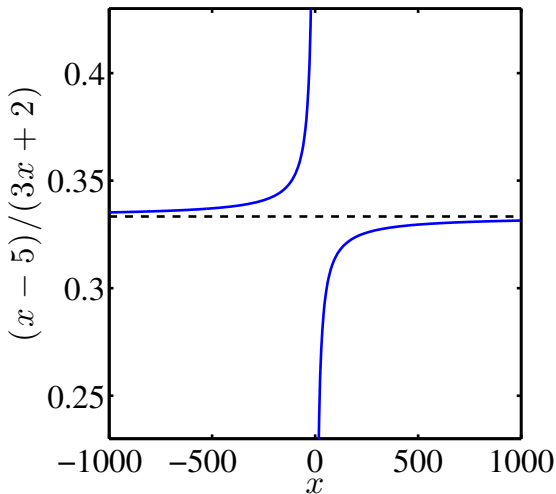
MATH110-001, Asymptotes

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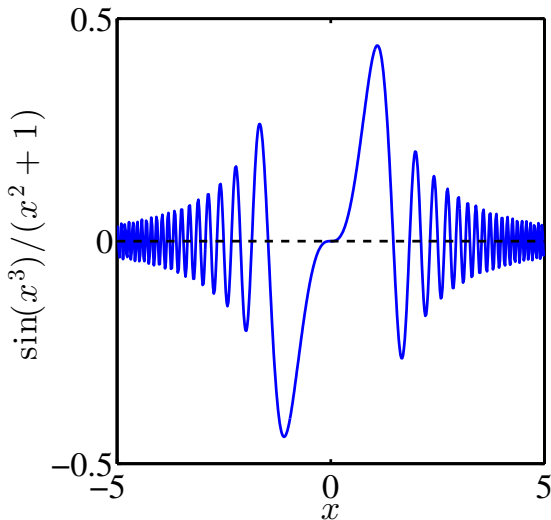
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Feb. 2016

limit as $x \rightarrow \infty$ 

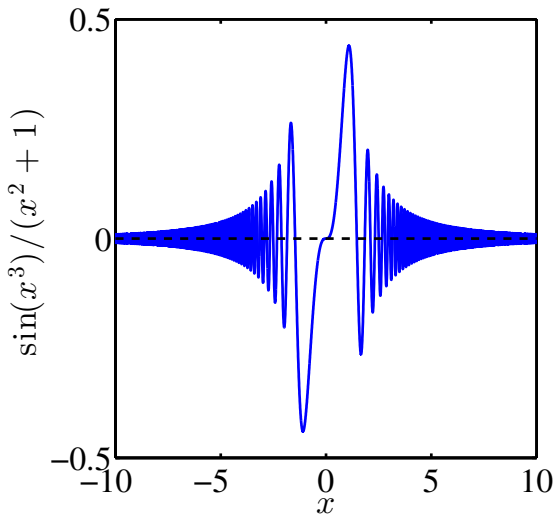
$$y = \frac{x - 5}{3x + 2}$$

dashed line is $y = 1/3$.

limit as $x \rightarrow \infty$ 

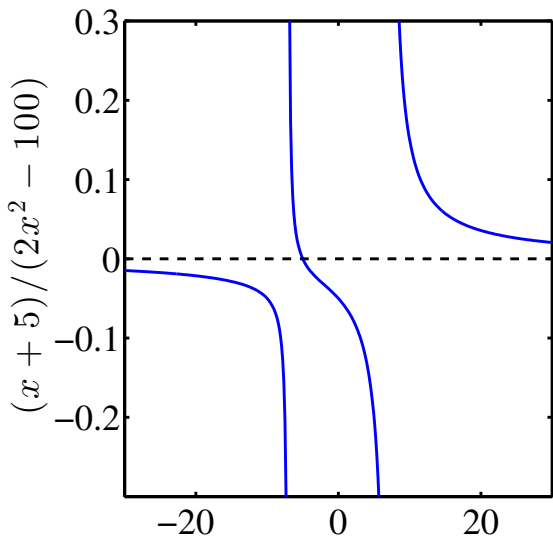
$$y = \frac{\sin(x^3)}{x^2 + 1}$$

dashed line is $y = 0$.

limit as $x \rightarrow \infty$ 

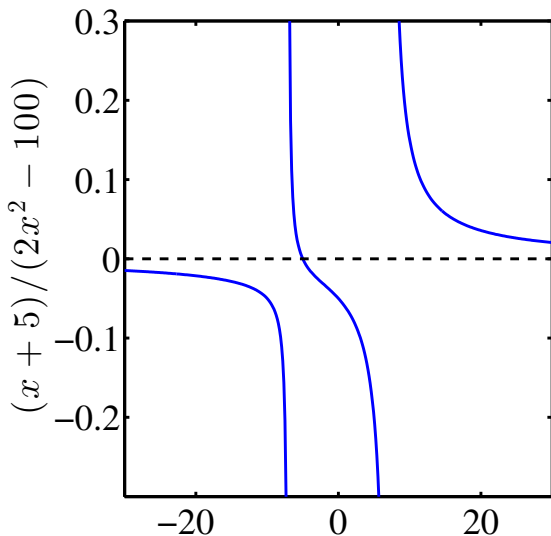
$$y = \frac{\sin(x^3)}{x^2 + 1}$$

dashed line is $y = 0$.

limit as $x \rightarrow \infty$ 

$$y = \frac{x + 5}{2x^2 - 100}$$

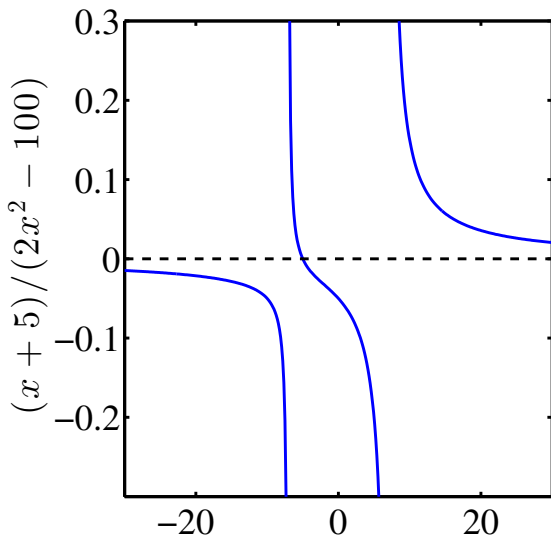
Dashed line is $y = 0$.

limit as $x \rightarrow \infty$ 

$$y = \frac{x + 5}{2x^2 - 100}$$

Dashed line is $y = 0$.

An asymptote is a line or curve that approaches a given curve arbitrarily closely.

limit as $x \rightarrow \infty$ 

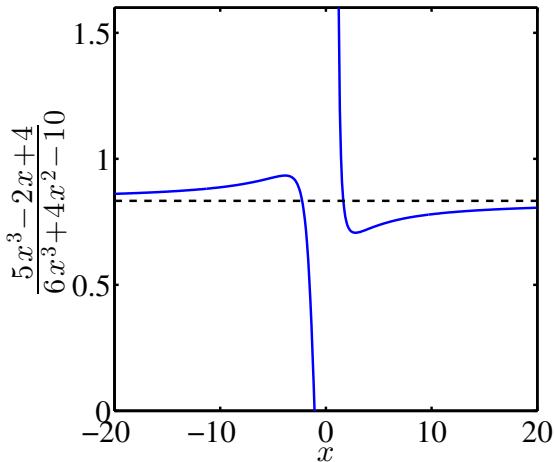
$$y = \frac{x + 5}{2x^2 - 100}$$

Dashed line is $y = 0$.

An asymptote is a line or curve that approaches a given curve arbitrarily closely.

$y = 0$ is a horizontal asymptote.

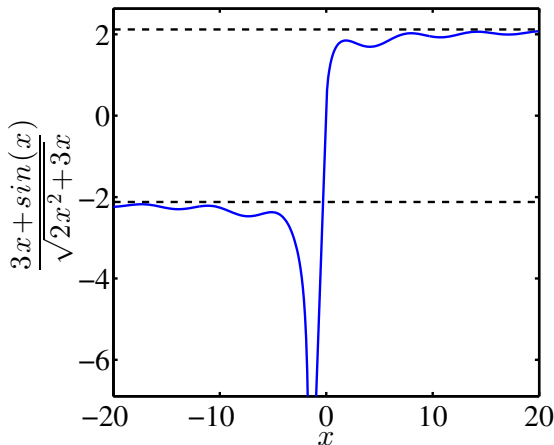
Horizontal Asymptotes



$$y = \frac{5x^3 - 2x + 4}{6x^3 + 4x^2 - 10}$$

dashed line, $y = 0$, is a horizontal asymptote.

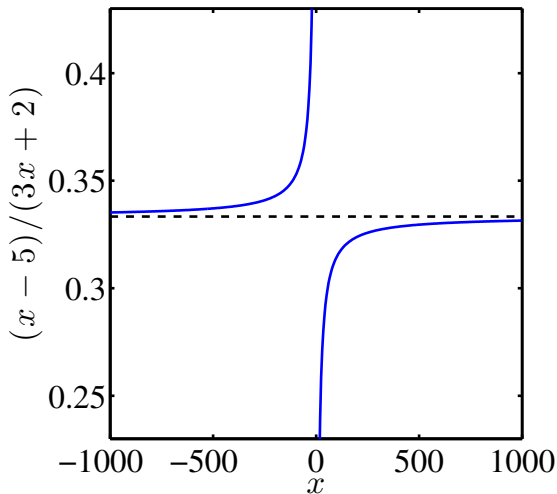
Horizontal Asymptotes



$$y = \frac{3x + \sin(x)}{\sqrt{2x^2 + 3x}}$$

dashed lines, $y = \pm 3/\sqrt{2}$,
are the horizontal
asymptotes.

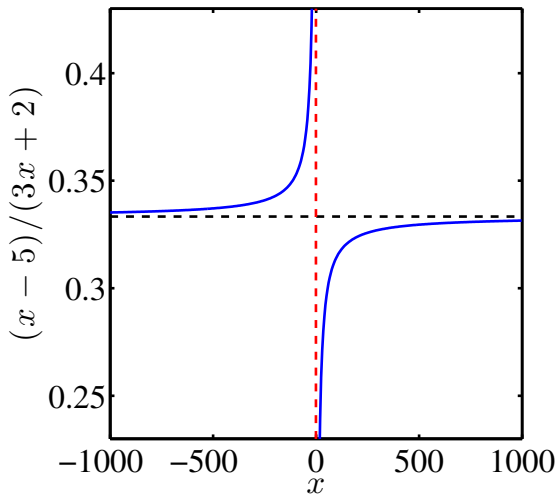
Other asymptotes?



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

black dashed line, $y = 0$, is the horizontal asymptote.

Other asymptotes?



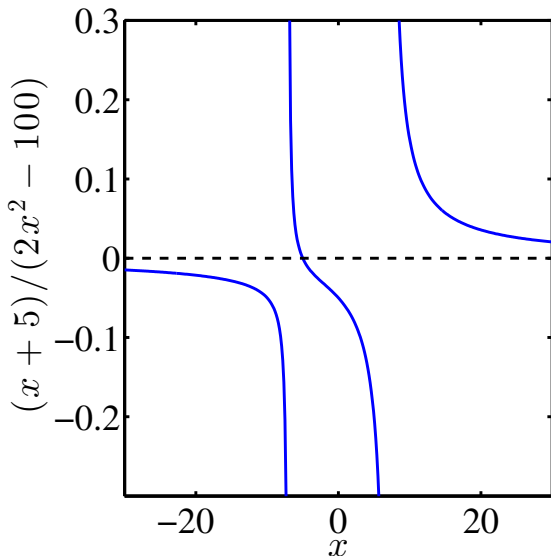
$$y = \frac{x - 5}{3x + 2}$$

black dashed line, $y = 0$, is the horizontal asymptote.

red dashed line is a vertical asymptote:

$$x = -1/3$$

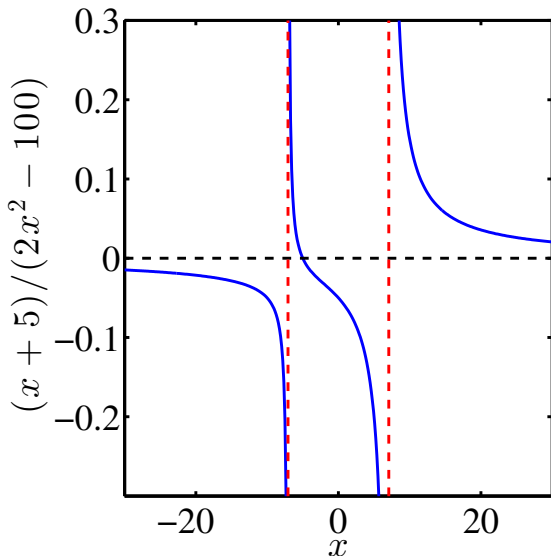
Horizontal and Vertical Asymptotes



$$y = \frac{x + 5}{2x^2 - 100}$$

black dashed line is the horizontal asymptote.

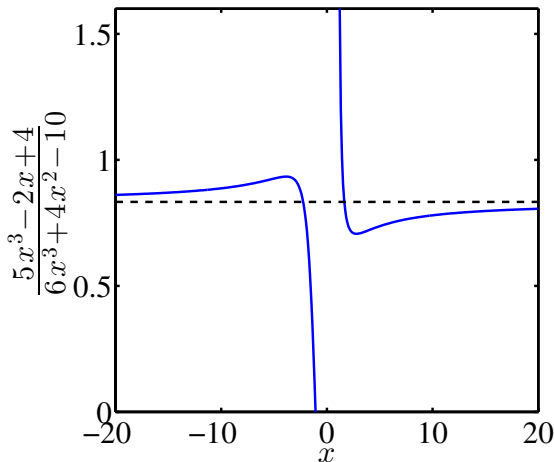
Horizontal and Vertical Asymptotes



$$y = \frac{x + 5}{2x^2 - 100}$$

black dashed line is the horizontal asymptote.
 red dashed lines are the vertical asymptotes.

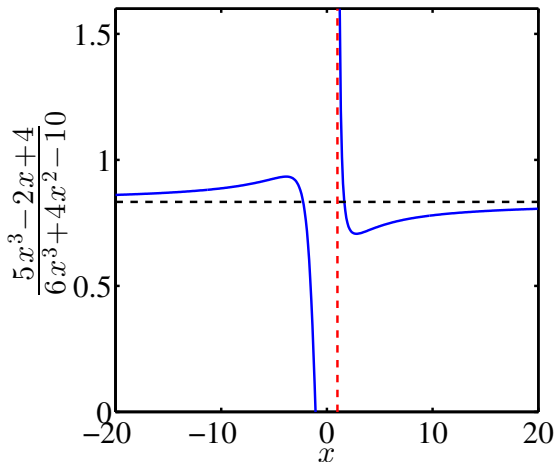
Horizontal and Vertical Asymptotes



$$y = \frac{5x^3 - 2x + 4}{6x^3 + 4x^2 - 10}$$

black dashed line is a horizontal asymptote.

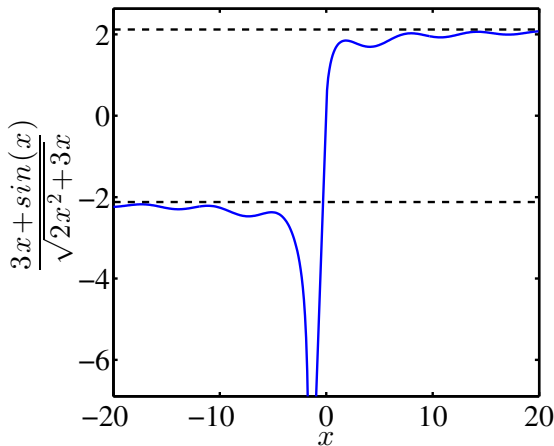
Horizontal and Vertical Asymptotes



$$y = \frac{5x^3 - 2x + 4}{6x^3 + 4x^2 - 10}$$

black dashed line is a horizontal asymptote. red dashed line is a vertical asymptote.

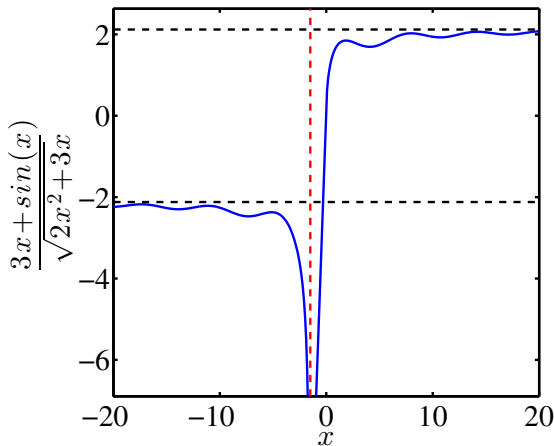
Horizontal and Vertical Asymptotes



$$y = \frac{3x + \sin(x)}{\sqrt{2x^2 + 3x}}$$

black dashed lines are the horizontal asymptotes.

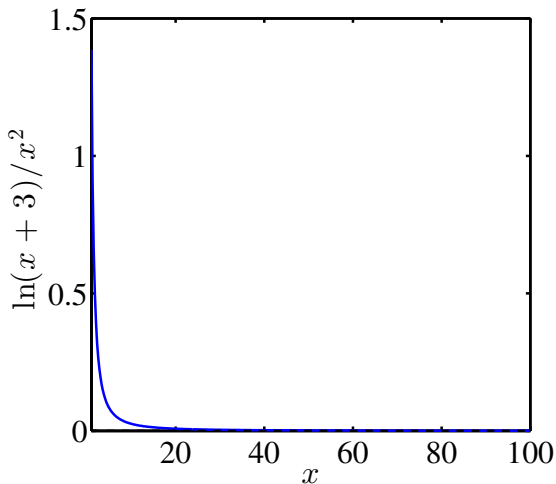
Horizontal and Vertical Asymptotes



$$y = \frac{3x + \sin(x)}{\sqrt{2x^2 + 3x}}$$

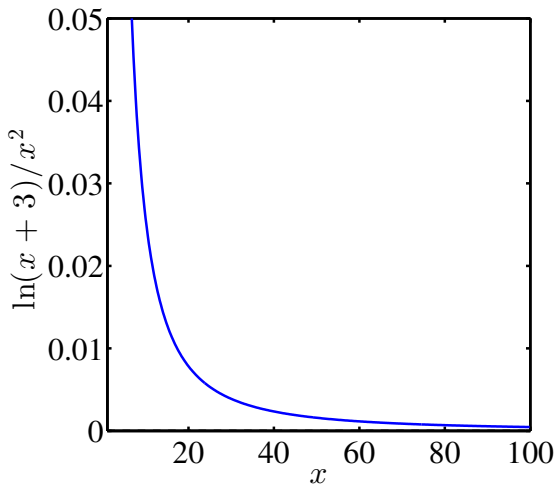
black dashed lines are the horizontal asymptotes.
red dashed line is a vertical asymptote.

Horizontal and Vertical Asymptotes



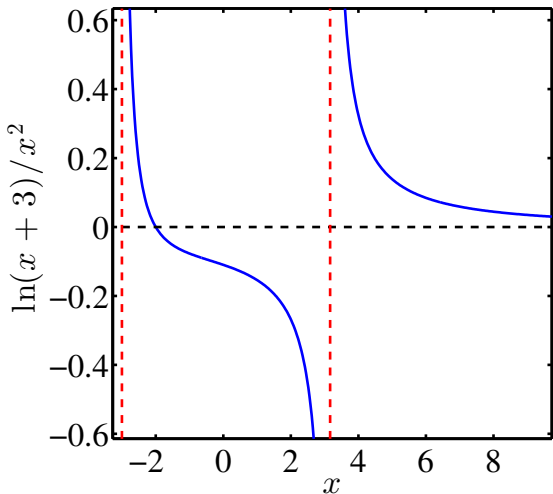
$$y = \frac{\ln(x+3)}{x^2}$$

Horizontal and Vertical Asymptotes



$$y = \frac{\ln(x+3)}{x^2}$$

Horizontal and Vertical Asymptotes



$$y = \frac{\ln(x+3) - 2}{x^2 - 10}$$

black dashed line is the horizontal asymptote.
red dashed lines are vertical asymptotes.