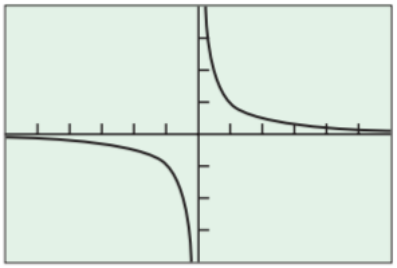
Horizontal Asymptote	The line $y = b$ when:

1. Use the graph below to determine:



a. $\lim_{x\to\infty} f(x) =$

b. $\lim_{x\to-\infty} f(x) =$

2. Find the $\lim_{x\to\infty} f(x)$ and $\lim_{x\to-\infty} f(x)$ of :

a. $f(x) = \frac{3(x+2)^2}{4-x^2}$

b. $f(x) = \frac{3x^3-x+1}{x+3}$

Vertical Asymptote	The line $x = a$ when:

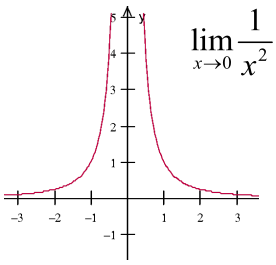
3. Find the following:

a. $\lim_{x\to2^-} \frac{x}{x-2}$

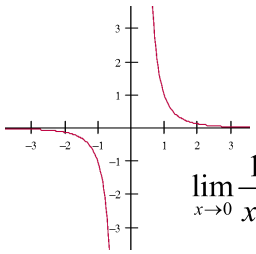
b. $\lim_{x\to(\frac{\pi}{2})^+} sec\, x$

4. Find the vertical asymptotes of the graph of $f(x)$. Describe the behavior of $f(x)$ to the left and right of each vertical asymptote.
   a. $f(x) = \frac{x-1}{2x+4}$

Unbounded Behavior:
behavior:

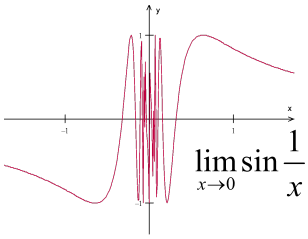


$$\lim_{x\to 0} \frac{1}{x^2} =$$



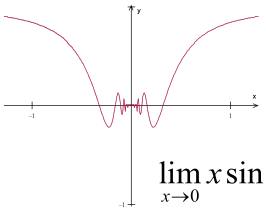
$$\lim_{x\to 0} \frac{1}{x^3} =$$

Oscillating Behavior:



$$\lim_{x\to 0} \sin\frac{1}{x} =$$

*Exception to oscillating



$$\lim_{x\to 0} x\sin\frac{1}{x} =$$

5. Sketch a graph of a function $y = f(x)$ that satisfies the stated conditions. Include any asymptotes.

$\lim_{x\to 2} f(x) = -1$ $\quad$ $\lim_{x\to 4^+} f(x) = -\infty$ $\quad$ $\lim_{x\to 4^-} f(x) = \infty$

$\lim_{x\to\infty} f(x) = \infty$ $\quad$ $\lim_{x\to -\infty} f(x) = 2$