Limits as x Approaches Infinity

Name _____

Date _____ Period _____

$$f(x) = \frac{4x^2}{x^2 + 1}$$

Find the limit of $f(x)$ as x approaches ∞ and $-\infty$.

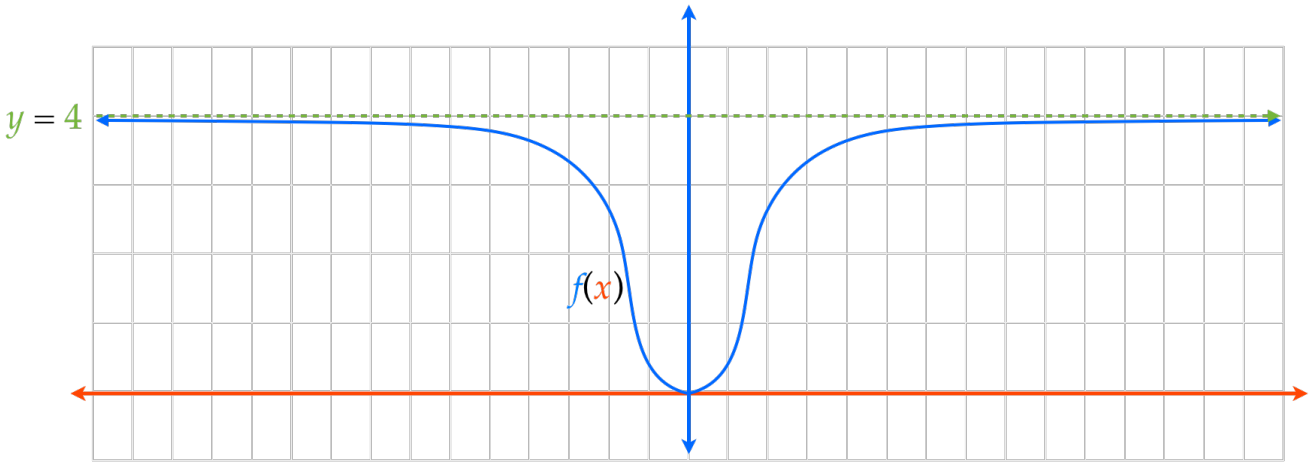
x approaches $-\infty$ | x approaches ∞

x	$-\infty$	-1,000	-100	-10	0	10	100	1,000	∞
$f(x)$	4	3.999	3.999	3.96	0	3.96	3.999	3.999	4

$f(x)$ gets closer and closer to 4 | $f(x)$ gets closer and closer to 4

$$\lim_{x \to -\infty} f(x) \qquad \lim_{x \to \infty} f(x)$$

$$f(x) = \frac{4x^2}{x^2 + 1}$$



$$f(x) = \frac{-x^2 + x + 3}{x^2 + 1}$$

Find the limit of $f(x)$ as x approaches ∞ and $-\infty$.

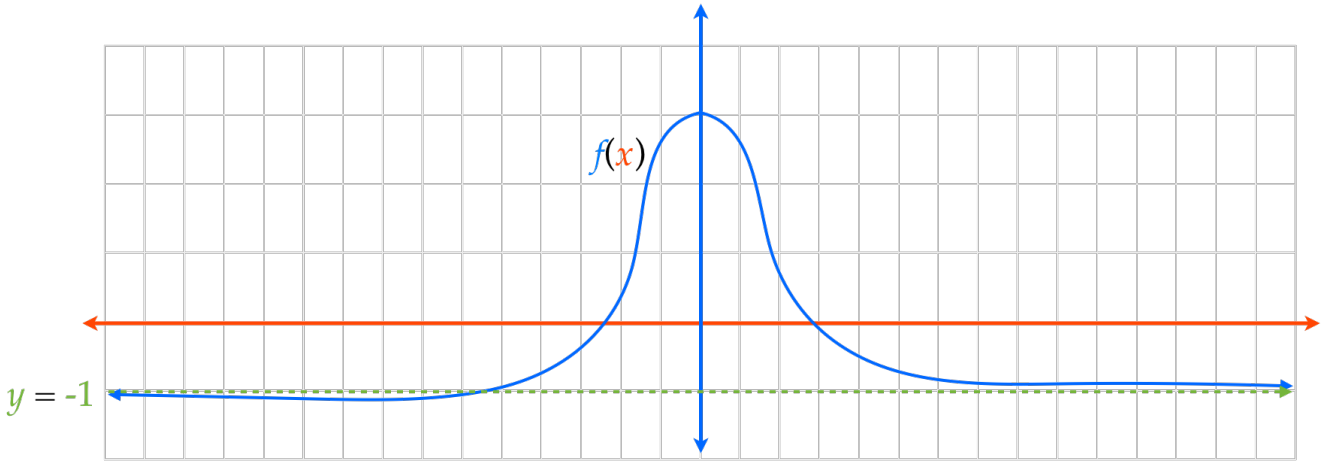
x approaches $-\infty$ | x approaches ∞

x	$-\infty$	-1,000	-100	-10	0	10	100	1,000	∞
$f(x)$	-1	-1.0001	-1.02	-1.06	3	-0.86	-0.98	-0.999	-1

$f(x)$ gets closer and closer to -1 | $f(x)$ gets closer and closer to -1

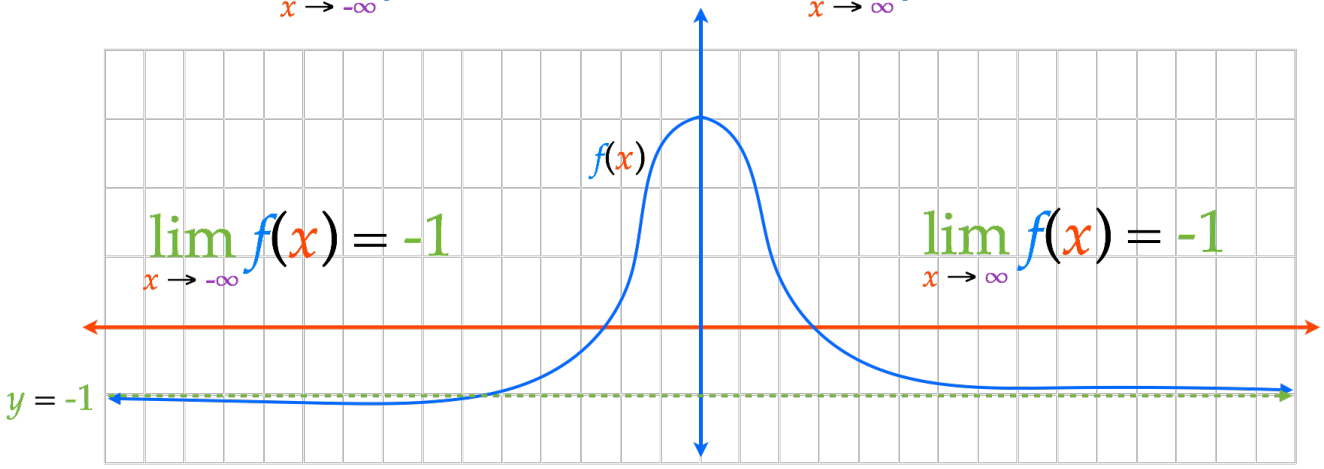
$$\lim_{x \to -\infty} f(x) \qquad \lim_{x \to \infty} f(x)$$

$$f(x) = \frac{-x^2 + x + 3}{x^2 + 1}$$



The line $y = L$ is a horizontal asymptote if…

$$\lim_{x \to -\infty} f(x) = L \quad \text{or} \quad \lim_{x \to \infty} f(x) = L$$



Given r is a positive rational number and c is any real number…

$$\lim_{x \to \infty} \frac{c}{x^r} = 0 \qquad \lim_{x \to -\infty} \frac{c}{x^r} = 0$$

$$\lim_{x \to \infty} \frac{6}{x} \qquad \lim_{x \to -\infty} \frac{32}{x^2}$$

Find the following limits

$$\lim_{x \to \infty} \frac{3x + 2}{x - 5}$$

Find the following limits

$$\lim_{x \to \infty} \frac{2x - 5}{3x^2 + 7}$$

Find the following limits

$$\lim_{x \to \infty} \frac{-2x^4 + x^2}{5x^3 - 1}$$

Find the following limits

$$\lim_{x \to -\infty} \frac{2x^2 - x}{4x^2 - 9}$$