Definition — 2009 Version Any

9) $\lim_{x \to -3^-} \frac{x}{\sqrt{x^2-9}} = -\infty$

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

if f is defined for all x on some open interval containing c except possibly at c itself and for any $M > 0$ there exists a $\delta > 0$ such that $f(x) > M$ whenever $0 < |x - c| < \delta$

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

if f is defined ... etc ...

And for any $N < 0$ there exists a $\delta > 0$ such that $f(x) < N$ whenever $0 < |x - c| < \delta$

One-sided limits work also

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

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

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

$\lim_{x \to 0} \frac{1}{x} = \text{DNE}$

Definition of Vertical Asymptote

~~y = f~~ $x = h$ is a vertical asymptote of $y = f(x)$ iff

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

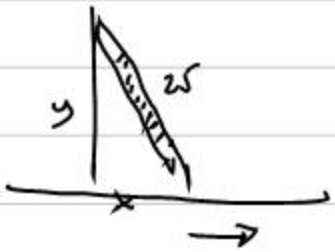
$$\lim_{x \to h^+} f(x) = -\infty \quad \text{or} \quad \lim_{x \to h^-} f(x) = -\infty$$

$$\lim_{x \to c} f(x) = \infty \quad \text{and} \quad \lim_{x \to c} g(x) = L, \; L \neq 0$$

then
$$\begin{cases} \lim_{x \to c} (f(x) + g(x)) = \infty \\ \lim_{x \to c} [f(x) g(x)] = \begin{cases} \infty & \text{if } L > 0 \\ -\infty & \text{if } L < 0 \end{cases} \end{cases}$$

$$\lim_{x \to c} \frac{f(x)}{g(x)} = \begin{cases} \infty & \text{if } L > 0 \\ -\infty & \text{if } L < 0 \end{cases}$$

$$\lim_{x \to c} \frac{g(x)}{f(x)} = 0$$



$$R(t) = \frac{2x}{\sqrt{625 - x^2}}$$

$$\lim_{x \to 25^-} R(t) = \infty$$