

The Intuitive Definition of an Infinite Limit

Infinite Limits

Suppose $f(x)$ is defined when x is near a . If by taking x sufficiently close to a but not equal to a

- we can make the values of $f(x)$ as **large positive** as we want, we write

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

- we can make the values of $f(x)$ as **large negative** as we want, we write

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

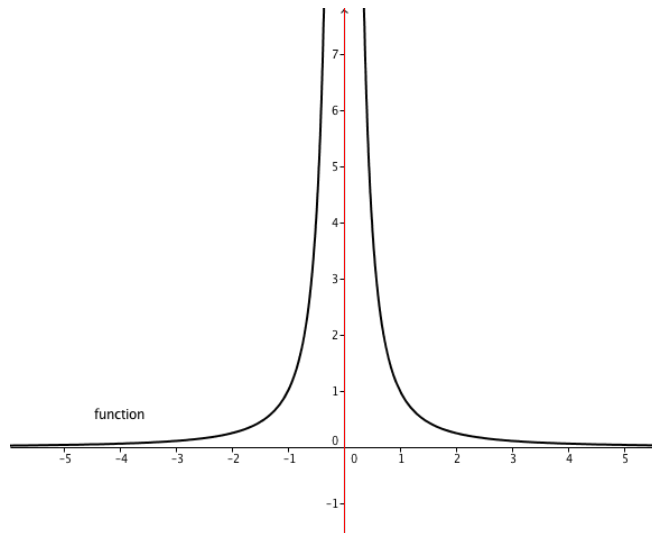
Vertical Asymptote

The line $x = a$ is called a **vertical asymptote** of the curve $y = f(x)$ if at least one of the above limits (1)-(6) holds.

Example 1.

Find the limit if it exists:

$$\lim_{x \rightarrow 0} \frac{1}{x^2}$$

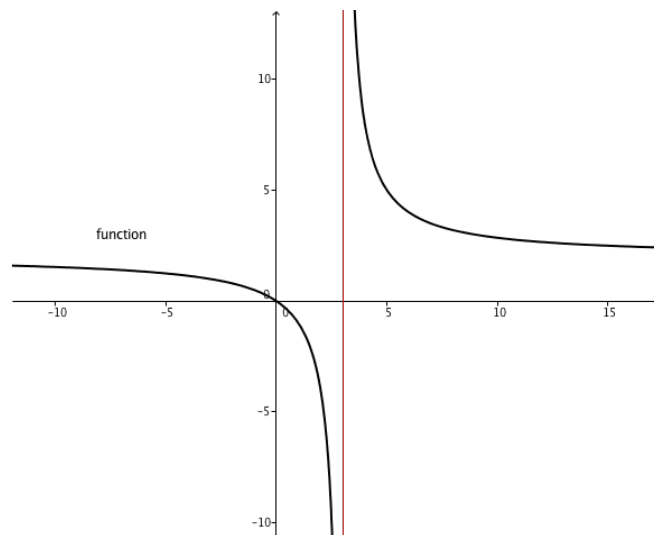


Example 2.

Find the limits if they exist:

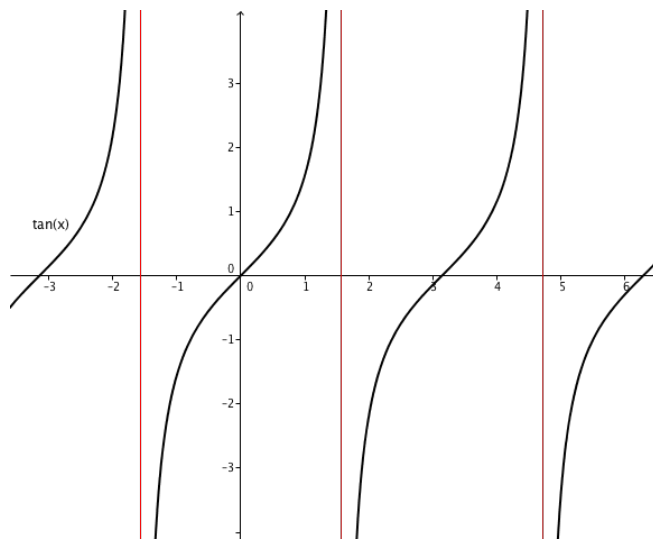
$$\lim_{x \rightarrow 3^+} \frac{2x}{x-3}$$

$$\lim_{x \rightarrow 3^-} \frac{2x}{x-3}$$



Example 3.

Find the vertical asymptotes of $f(x) = \tan x$.



The natural logarithmic function $y = \ln x$ has a vertical asymptote.

