

DEFINITION OF A VERTICAL ASYMPTOTE (§2.2)

The line $x = a$ is a **vertical asymptote** of the graph of a function $y = f(x)$ if either

$$\lim_{x \rightarrow a^+} f(x) = \pm\infty \quad \text{or} \quad \lim_{x \rightarrow a^-} f(x) = \pm\infty$$

Important ♪: Infinity is NOT a number, and thus the limit FAILS to exist in both of these cases. If this seems confusing, then use the notation as $x \rightarrow a$ (from the right or left), then the function $f(x) \rightarrow \pm\infty$.

A second ♪: *Vertical Asymptotes* occur in rational functions when the denominator equals 0, and the numerator does not.