**Source:** [KBhMATH401Limits]

# 1 | The Limit Notation

## Single-Sided Limits

Definition 1 · **Right Single-Sided Limit** $\lim_{x \to a^+} f(x)$
"What is $y$ approaching when $x$ approaches $a$ from the right ($+$)?"

Definition 2 · **Left Single-Sided Limit** $\lim_{x \to a^-} f(x)$
"What is $y$ approaching when $x$ approaches $a$ from the left ($-$)?"

**Watch!** If both the left and right single-sided limit exists and is the same, the Double-Sided Limit exists.

## Double-sided Limits

Definition 3 · **Left Single-Sided Limit** $\lim_{x \to a} f(x)$
"What is $y$ approaching when $x$ approaches $a$?" This exists only if $\lim_{x \to a^-} f(x) = \lim_{x \to a^+} f(x)$

**Vocab!** When the Double-Sided Limit does not exist, it is called *DOES NOT EXIST!*. It is not! ~~*undefined*~~