

Limits: Summary

Types of limits

$$(1) \lim_{n \rightarrow \infty} a_n$$

$$(2) \lim_{x \rightarrow \infty} f(x)$$

$$(3) \lim_{x \rightarrow -\infty} f(x)$$

$$(4) \lim_{x \rightarrow a^+} f(x)$$

$$(5) \lim_{x \rightarrow a^-} f(x)$$

$$(6) \lim_{x \rightarrow a} f(x)$$

$$\lim_{\square \rightarrow ***} f(\square) \left\{ \begin{array}{l} = L \\ \text{does not exist} \end{array} \right.$$

$$\lim_{\square \rightarrow ***} f(\square) \begin{cases} = L \\ \text{does not exist} \end{cases} \begin{cases} = \infty \\ = -\infty \\ \text{oscillation or other behavior} \end{cases}$$

$$\lim_{\square \rightarrow ***} f(\square) \begin{cases} = L \\ \text{does not exist} \end{cases} \begin{cases} = \infty \\ = -\infty \\ \text{oscillation or other behavior} \end{cases}$$

Roughly, $\lim_{\square \rightarrow ***} f(\square) = \blacktriangle$ means when \square is “close to” $***$, $f(\square)$ is “close to” \blacktriangle .

$$\lim_{\square \rightarrow ***} f(\square) \begin{cases} = L \\ \text{does not exist} \end{cases} \begin{cases} = \infty \\ = -\infty \\ \text{oscillation or other behavior} \end{cases}$$

Roughly, $\lim_{\square \rightarrow ***} f(\square) = \blacktriangle$ means when \square is “close to” $***$, $f(\square)$ is “close to” \blacktriangle .

- \blacktriangle can be L , ∞ or $-\infty$.

$$\lim_{\square \rightarrow ***} f(\square) \begin{cases} = L \\ \text{does not exist} \end{cases} \begin{cases} = \infty \\ = -\infty \\ \text{oscillation or other behavior} \end{cases}$$

Roughly, $\lim_{\square \rightarrow ***} f(\square) = \blacktriangle$ means when \square is “close to” $***$, $f(\square)$ is “close to” \blacktriangle .

- \blacktriangle can be L , ∞ or $-\infty$.

Meaning of “close to”

- Close to ∞ means *large positive*;

$$\lim_{\square \rightarrow ***} f(\square) \begin{cases} = L \\ \text{does not exist} \end{cases} \begin{cases} = \infty \\ = -\infty \\ \text{oscillation or other behavior} \end{cases}$$

Roughly, $\lim_{\square \rightarrow ***} f(\square) = \blacktriangle$ means when \square is “close to” $***$, $f(\square)$ is “close to” \blacktriangle .

- \blacktriangle can be L , ∞ or $-\infty$.

Meaning of “close to”

- Close to ∞ means *large positive*;
- close to $-\infty$ means *large negative*;

$$\lim_{\square \rightarrow ***} f(\square) \begin{cases} = L \\ \text{does not exist} \end{cases} \begin{cases} = \infty \\ = -\infty \\ \text{oscillation or other behavior} \end{cases}$$

Roughly, $\lim_{\square \rightarrow ***} f(\square) = \blacktriangle$ means when \square is “close to” $***$, $f(\square)$ is “close to” \blacktriangle .

- \blacktriangle can be L , ∞ or $-\infty$.
- $***$ can be ∞ ,

Meaning of “close to”

- Close to ∞ means *large positive*;
- close to $-\infty$ means *large negative*;

$$\lim_{\square \rightarrow ***} f(\square) \begin{cases} = L \\ \text{does not exist} \end{cases} \begin{cases} = \infty \\ = -\infty \\ \text{oscillation or other behavior} \end{cases}$$

Roughly, $\lim_{\square \rightarrow ***} f(\square) = \blacktriangle$ means when \square is “close to” $***$, $f(\square)$ is “close to” \blacktriangle .

- \blacktriangle can be L , ∞ or $-\infty$.
- $***$ can be ∞ , $-\infty$,

Meaning of “close to”

- Close to ∞ means *large positive*;
- close to $-\infty$ means *large negative*;

$$\lim_{\square \rightarrow ***} f(\square) \begin{cases} = L \\ \text{does not exist} \end{cases} \begin{cases} = \infty \\ = -\infty \\ \text{oscillation or other behavior} \end{cases}$$

Roughly, $\lim_{\square \rightarrow ***} f(\square) = \blacktriangle$ means when \square is “close to” $***$, $f(\square)$ is “close to” \blacktriangle .

- \blacktriangle can be L , ∞ or $-\infty$.
- $***$ can be ∞ , $-\infty$, $a+$,

Meaning of “close to”

- Close to ∞ means *large positive*;
- close to $-\infty$ means *large negative*;

$$\lim_{\square \rightarrow ***} f(\square) \begin{cases} = L \\ \text{does not exist} \end{cases} \begin{cases} = \infty \\ = -\infty \\ \text{oscillation or other behavior} \end{cases}$$

Roughly, $\lim_{\square \rightarrow ***} f(\square) = \blacktriangle$ means when \square is “close to” $***$, $f(\square)$ is “close to” \blacktriangle .

- \blacktriangle can be L , ∞ or $-\infty$.
- $***$ can be ∞ , $-\infty$, $a+$,

Meaning of “close to”

- Close to ∞ means *large positive*;
- close to $-\infty$ means *large negative*;
- close to $a+$ means *close to and greater than a* etc.

$$\lim_{\square \rightarrow ***} f(\square) \begin{cases} = L \\ \text{does not exist} \end{cases} \begin{cases} = \infty \\ = -\infty \\ \text{oscillation or other behavior} \end{cases}$$

Roughly, $\lim_{\square \rightarrow ***} f(\square) = \blacktriangle$ means when \square is “close to” $***$, $f(\square)$ is “close to” \blacktriangle .

- \blacktriangle can be L , ∞ or $-\infty$.
- $***$ can be ∞ , $-\infty$, $a+$, $a-$

Meaning of “close to”

- Close to ∞ means *large positive*;
- close to $-\infty$ means *large negative*;
- close to $a+$ means *close to and greater than a* etc.

$$\lim_{\square \rightarrow ***} f(\square) \begin{cases} = L \\ \text{does not exist} \end{cases} \begin{cases} = \infty \\ = -\infty \\ \text{oscillation or other behavior} \end{cases}$$

Roughly, $\lim_{\square \rightarrow ***} f(\square) = \blacktriangle$ means when \square is “close to” $***$, $f(\square)$ is “close to” \blacktriangle .

- \blacktriangle can be L , ∞ or $-\infty$.
- $***$ can be ∞ , $-\infty$, $a+$, $a-$ or a

Meaning of “close to”

- Close to ∞ means *large positive*;
- close to $-\infty$ means *large negative*;
- close to $a+$ means *close to and greater than a* etc.

$$\lim_{\square \rightarrow ***} f(\square) \begin{cases} = L \\ \text{does not exist} \end{cases} \begin{cases} = \infty \\ = -\infty \\ \text{oscillation or other behavior} \end{cases}$$

Roughly, $\lim_{\square \rightarrow ***} f(\square) = \blacktriangle$ means when \square is “close to” $***$, $f(\square)$ is “close to” \blacktriangle .

- \blacktriangle can be L , ∞ or $-\infty$.
- $***$ can be ∞ , $-\infty$, $a+$, $a-$ or a

Meaning of “close to”

- Close to ∞ means *large positive*;
- close to $-\infty$ means *large negative*;
- close to $a+$ means *close to and greater than a* etc.
- close to a means *close to a but $\neq a$*