BC Calculus

Limit Definitions

Definition: $\lim_{x \to a} f(x) = L$ if and only if $\forall\ \varepsilon > 0, \exists\ \delta > 0$ such that

$$0 < |x - a| < \delta \ \Rightarrow\ |f(x) - L| < \varepsilon .$$

Definition: $\lim_{x \to \infty} f(x) = L$ if and only if $\forall\ \varepsilon > 0, \exists\ M > 0$ such that

$$x > M \ \Rightarrow\ |f(x) - L| < \varepsilon .$$

Definition: $\lim_{x \to a} f(x) = \infty$ if and only if $\forall\ N > 0, \exists\ \delta > 0$ such that

$$0 < |x - a| < \delta \ \Rightarrow\ f(x) > N .$$

Definition: $\lim_{x \to -\infty} f(x) = L$

Definition: $\lim_{x \to a} f(x) = -\infty$

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

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

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One-sided definitions:

Definition: $\lim_{x \to a^+} f(x) = L$

Definition: $\lim_{x \to a^-} f(x) = L$

Definition: $\lim_{x \to a^+} f(x) = \infty$

Definition: $\lim_{x \to a^-} f(x) = \infty$