

Math 151: Calculus I

Limit Laws

Suppose that c is a constant and the limits $\lim_{x \rightarrow a} f(x)$ and $\lim_{x \rightarrow a} g(x)$ exist. Then:

$$1.) \lim_{x \rightarrow a} [f(x) + g(x)] = \lim_{x \rightarrow a} f(x) + \lim_{x \rightarrow a} g(x)$$

$$2.) \lim_{x \rightarrow a} [f(x) - g(x)] = \lim_{x \rightarrow a} f(x) - \lim_{x \rightarrow a} g(x)$$

$$3.) \lim_{x \rightarrow a} [c f(x)] = c \lim_{x \rightarrow a} f(x)$$

$$4.) \lim_{x \rightarrow a} [f(x) \cdot g(x)] = \lim_{x \rightarrow a} f(x) \cdot \lim_{x \rightarrow a} g(x)$$

$$5.) \lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \frac{\lim_{x \rightarrow a} f(x)}{\lim_{x \rightarrow a} g(x)} \text{ if } \lim_{x \rightarrow a} g(x) \neq 0$$

$$6.) \lim_{x \rightarrow a} [f(x)]^n = \left[\lim_{x \rightarrow a} f(x) \right]^n \text{ where } n \text{ is a positive integer}$$

$$7.) \lim_{x \rightarrow a} c = c$$

$$8.) \lim_{x \rightarrow a} x = a$$

$$9.) \lim_{x \rightarrow a} x^n = a^n \text{ where } n \text{ is a positive integer}$$

$$10.) \lim_{x \rightarrow a} \sqrt[n]{x} = \sqrt[n]{a} \text{ where } n \text{ is a positive integer. If } n \text{ is even, we assume that } a > 0$$

$$11.) \lim_{x \rightarrow a} \sqrt[n]{f(x)} = \sqrt[n]{\lim_{x \rightarrow a} f(x)} \text{ where } n \text{ is a positive integer. If } n \text{ is even, we assume } \lim_{x \rightarrow a} f(x) > 0$$