

# Limit Laws

**LIMIT LAWS** Suppose that  $c$  is a constant and the limits

$$\lim_{x \rightarrow a} f(x) \quad \text{and} \quad \lim_{x \rightarrow a} g(x)$$

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

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

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

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

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

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

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

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

11.  $\lim_{x \rightarrow a} \sqrt[n]{f(x)} = \sqrt[n]{\lim_{x \rightarrow a} f(x)}$  where  $n$  is a positive integer

[If  $n$  is even, we assume that  $\lim_{x \rightarrow a} f(x) > 0$ .]