Properties of Limits

1. **Basic Limits**: Let b and c be real numbers and let n be a positive integer.

   (a) $\lim_{x \to c} b = b$

   (b) $\lim_{x \to c} x = c$

   (c) $\lim_{x \to c} x^n = c^n$

2. **Properties of Limits**: Let b and c be real numbers, let n be a positive integer, and let f and g be functions with the following limits.

$$\lim_{x \to c} f(x) = L \quad \text{and} \quad \lim_{x \to c} g(x) = K$$

   (a) Scalar multiple: $\lim_{x \to c}[bf(x)] = bL$

   (b) Sum or difference: $\lim_{x \to c}[f(x) \pm g(x)] = L \pm K$

   (c) Product: $\lim_{x \to c}[f(x)g(x)] = LK$

   (d) Quotient: $\lim_{x \to c} \dfrac{f(x)}{g(x)} = \dfrac{L}{K}$ (provided $K \neq 0$)

   (e) Power: $\lim_{x \to c}[f(x)]^n = L^n$

3. **Limit of a Composite Function**: If f and g are functions such that $\lim_{x \to c} g(x) = L$ and $\lim_{x \to L} f(x) = f(L)$, then

$$\lim_{x \to c} f(g(x)) = f\left(\lim_{x \to c} g(x)\right) = f(L).$$

4. **Squeeze Theorem**: If $h(x) \leq f(x) \leq g(x)$ for all x in an open interval containing c, except possibly at c itself, and if

$$\lim_{x \to c} h(x) = L = \lim_{x \to c} g(x),$$

   then $\lim_{x \to c} f(x)$ exists and equals L.