1 General Limit Laws

Suppose $\lim_{x\to a} f(x)$ and $\lim_{x\to a} g(x)$ both exist, and let c be any constant.

1. Sum Law: $\lim_{x \to a} [f(x) + g(x)] = \lim_{x \to a} f(x) + \lim_{x \to a} g(x)
 \\
 2. Difference Law:<math display="block">
 \lim_{x \to a} [f(x) - g(x)] = \lim_{x \to a} f(x) - \lim_{x \to a} g(x)
 \\
 3. Constant Multiplier Law:<math display="block">
 \lim_{x \to a} [cf(x)] = c \lim_{x \to a} f(x)
 \\
 4. Product Law:<math display="block">
 \lim_{x \to a} [f(x)g(x)] = \left(\lim_{x \to a} f(x)\right) \left(\lim_{x \to a} g(x)\right)
 \\
 5. Quotient Law:<math display="block">
 \lim_{x \to a} \left[\frac{f(x)}{g(x)} \right] = \frac{\lim_{x \to a} f(x)}{\lim_{x \to a} g(x)} \text{ provided } \lim_{x \to a} g(x) \neq 0.
 \end{aligned}$ 6. Power Law: $\lim_{x \to a} [f(x)]^n = \left[\lim_{x \to a} f(x)\right]^n \text{ where } n \text{ is a positive integer.}$ 7. Root Law: $\lim_{x \to a} \sqrt[n]{f(x)} = \sqrt[n]{\lim_{x \to a} f(x)} \text{ where } n \text{ is a positive integer, and where } \lim_{x \to a} f(x) > 0 \text{ if } n \text{ is even.}$

2 Particular Limit Results

1. Constants:	$\lim_{x\to a} c = c$
2. Limit of $f(x) = x$:	$\lim_{x \to a} x = a$
3. Polynomials:	If $f(x)$ is a polynomial (for eg. $f(x) = 5x^3 - \pi x^2 - 1/2$) then $\lim_{x \to a} f(x) = f(a)$.
4. Rational Functions:	If $f(x)$ and $g(x)$ are polynomials and $g(a) eq 0$ then $\lim_{x o a} rac{f(x)}{g(x)} = rac{f(a)}{g(a)}$.
5. Squeeze Theorem:	If $f(x) \leq g(x) \leq h(x)$ for x near a and $\lim_{x \to a} f(x) = \lim_{x \to a} h(x) = L$, then $\lim_{x \to a} g(x) = L$.
6. Important Trig Limit:	$\lim_{x\to 0}\frac{\sin{(x)}}{x}=1$