Limit Laws

For functions f(x) and g(x), where $\lim_{x\to a} f(x) = L$ and $\lim_{x\to a} g(x) = M$, the following rules apply:

Sum Law	$\lim_{x\to a}\big(f(x) + g(x)\big) = \lim_{x\to a} f(x) + \lim_{x\to a} g(x) = L + M$
Difference Law	$\lim_{x\to a}\big(f(x) - g(x)\big) = \lim_{x\to a} f(x) - \lim_{x\to a} g(x) = L - M$
Constant Multiple Law	$\lim_{x\to a}\big(c \cdot f(x)\big) = c \cdot \lim_{x\to a} f(x) = c \cdot L$
Product Law	$\lim_{x\to a}\big(f(x) \cdot g(x)\big) = \lim_{x\to a} f(x) \cdot \lim_{x\to a} g(x) = L \cdot M$
Quotient Law	$\lim_{x\to a} \frac{f(x)}{g(x)} = \frac{\lim_{x\to a} f(x)}{\lim_{x\to a} g(x)} = \frac{L}{M}$ for $M \neq 0$
Power Law	$\lim_{x\to a}\big(f(x)\big)^n = \left(\lim_{x\to a} f(x)\right)^n = L^n$ for every positive integer n
Root Law	$\lim_{x\to a} \sqrt[n]{f(x)} = \sqrt[n]{\lim_{x\to a} f(x)} = \sqrt[n]{L}$ for all L if n is odd and for $L \geq 0$ if n is even and $f(x) \geq 0$

For limits that cannot be determined with these rules, see the L'Hopital's Rule handout.