Properties of Limits

Make $\lim_{x\to c} f(x) = L$ and $\lim_{x\to c} g(x) = M$

Sum Rule	$\lim_{x\to c}(f(x)+g(x)) = \lim_{x\to c} f(x) + \lim_{x\to c} g(x)$ $= L+M$
Difference Rule	$\lim_{x\to c}(f(x)-g(x)) = \lim_{x\to c} f(x) - \lim_{x\to c} g(x)$ $= L-M$
Product Rule	$\lim_{x\to c}(f(x)\bullet g(x)) = \lim_{x\to c} f(x) \bullet \lim_{x\to c} g(x)$ $= LM$
Constant Multiple Rule	$\lim_{x\to c}(k\bullet f(x)) = k \bullet \lim_{x\to c} f(x)$ $= k\cdot L$
Quotient Rule	$\lim_{x\to c}\frac{f(x)}{g(x)} = \frac{\lim_{x\to c} f(x)}{\lim_{x\to c} g(x)}$ $= \frac{L}{M}$
Power Rule	$\lim_{x\to c}(f(x))^n = (\lim_{x\to c} f(x))^n$, for n is a positive integer $= L^n$
Root Rule	$\lim_{x\to c}\sqrt[n]{f(x)} = \sqrt[n]{\lim_{x\to c} f(x)}$ *for* $n \geq 2$ *and* $\lim_{x\to c}\sqrt[n]{f(x)}$ are real numbers $= \sqrt[n]{L}$ or $L^{\frac{1}{n}}$

One limit to memorize:

$$\lim_{x\to 0}\frac{\sin x}{x} = 1$$

→ See Graph

$\lim_{x\to 0}\frac{\sin 2x}{2x} = 1$

$\lim_{x\to 0}\frac{\sin 3x}{3x} = 1$

Rule: $\lim_{x\to 0}\frac{\sin ax}{ax} = 1$

Rule $\lim_{x\to \infty}\frac{\sin ax}{ax} = 0$