

Standard Limit Formulas

$$\lim_{x \rightarrow 0} \frac{\sin x}{x} = \lim_{x \rightarrow 0} \frac{\tan x}{x} = 1$$

$$\lim_{x \rightarrow 0} \frac{\tan^{-1} x}{x} = \lim_{x \rightarrow 0} \frac{\sin^{-1} x}{x} = 1$$

$$\lim_{x \rightarrow 0} (1 + x)^{1/x} = e$$

$$\lim_{x \rightarrow 0} (1 + ax)^{1/x} = e^a$$

$$\lim_{x \rightarrow \infty} (1 + 1/x)^x = e$$

$$\lim_{x \rightarrow \infty} (1 + a/x)^x = e^a$$

$$\lim_{x \rightarrow 0} \frac{e^x - 1}{x} = 1$$

$$\lim_{x \rightarrow 0} \frac{a^x - 1}{x} = \ln a \quad ; a > 0$$

$$\lim_{x \rightarrow 0} \frac{\ln(1 + x)}{x} = 1$$

$$\lim_{x \rightarrow 0} \frac{x^n - a^n}{x - a} = na^{n-1}$$

If $f(x) \rightarrow 0$ when $x \rightarrow a$ then :

$$\lim_{x \rightarrow a} \frac{\sin f(x)}{f(x)} = 1$$

$$\lim_{x \rightarrow a} \frac{\tan f(x)}{f(x)} = 1$$

$$\lim_{x \rightarrow a} \cos f(x) = 1$$

$$\lim_{x \rightarrow a} \frac{e^{f(x)} - 1}{f(x)} = 1$$

$$\lim_{x \rightarrow a} \frac{b^{f(x)} - 1}{f(x)} = \ln b \ ; b > 0$$

$$\lim_{x \rightarrow a} \frac{\ln(1 + f(x))}{f(x)} = 1$$

$$\lim_{x \rightarrow a} (1 + f(x))^{\frac{1}{f(x)}} = e$$