

Limits Formula Sheet:

Trigonometric Limits:

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

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

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

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

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

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

$$\lim_{x \rightarrow \infty} \frac{\sin(1/x)}{1/x} = 1$$

$$\lim_{x \rightarrow \infty} \frac{\sin x}{x} = \lim_{x \rightarrow \infty} \frac{\cos x}{x} = 0$$

Exponential Limits:

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

$$\lim_{x \rightarrow \infty} \left[1 + \frac{1}{x}\right]^x = \lim_{x \rightarrow \infty} \left[\frac{x+1}{x}\right]^x = e$$

$$\lim_{x \rightarrow 0} [1 + x]^{1/x} = e \qquad \lim_{x \rightarrow \infty} \left[1 + \frac{a}{x}\right]^x = e^a$$

Logarithmic Limits:

$$\lim_{x \rightarrow 0} \frac{\ln(1+x)}{x} = 1 \qquad \lim_{x \rightarrow 0} \frac{a^x - 1}{x} = \ln a$$

Other Limits:

$$\lim_{x \rightarrow 0} \frac{[1+x]^n - 1}{x} = n$$