

C12 - 1.5 - Trig Limits Notes

$$\lim_{x \rightarrow \frac{\pi}{2}} \frac{\sin x}{\sin(\frac{\pi}{2})} = \textcircled{1}$$

$$\lim_{x \rightarrow \infty} \frac{\sin(\frac{1}{x})}{\sin 0} = \boxed{\begin{matrix} x \rightarrow \infty \\ \frac{1}{x} \rightarrow 0 \end{matrix}}$$

$$\lim_{x \rightarrow \infty} \frac{\cos(\frac{1}{x})}{\cos 0} = \textcircled{1}$$

$$\lim_{x \rightarrow 0} \sin\left(\frac{1}{x}\right) = \text{und}$$

Identities

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

L'hopital's Rule

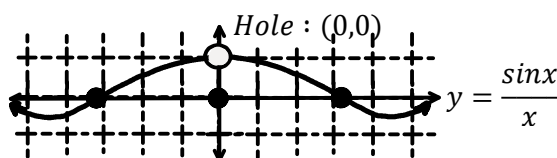
$$\lim_{x \rightarrow 0} \frac{\tan x}{x} = \lim_{x \rightarrow 0} \frac{\sec^2 x}{1} = 1$$

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

Conjugate

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

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



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

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

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

$$\lim_{x \rightarrow 0} \frac{\sin(\text{that})}{(\text{that})} = 1$$

$$\lim_{x \rightarrow 0} \frac{\sin 2x}{x} \times \frac{2}{2} = \lim_{x \rightarrow 0} \frac{\sin 2x}{2x} \times 2 = 1 \times 2 = \textcircled{2}$$

$$\lim_{x \rightarrow 0} \frac{\sin 2x}{4x} = \lim_{x \rightarrow 0} \frac{\sin 2x}{2x} \times \frac{1}{2} = 1 \times \frac{1}{2} = \textcircled{\frac{1}{2}}$$

$$\lim_{x \rightarrow 0} \frac{\sin 2x}{\sin 3x} = \lim_{x \rightarrow 0} \frac{1}{\sin 3x} \times \frac{2x}{3x} = \lim_{x \rightarrow 0} \frac{1}{\sin 3x} \times \frac{2}{3} = \frac{2}{3} \times \lim_{x \rightarrow 0} \frac{1}{\sin 3x} = \frac{2}{3} \times \frac{1}{1} = \textcircled{\frac{2}{3}}$$

$$\lim_{x \rightarrow 0} \frac{\tan 4x}{\tan 3x} = \lim_{x \rightarrow 0} \frac{1}{\tan 3x} \times \frac{4x}{3x} = \lim_{x \rightarrow 0} \frac{1}{\tan 3x} \times \frac{4}{3} = \frac{4}{3} \times \lim_{x \rightarrow 0} \frac{1}{\tan 3x} = \frac{4}{3} \times \frac{1}{1} = \textcircled{\frac{4}{3}}$$

$$\lim_{x \rightarrow 0} \frac{\sin x}{2x} = \lim_{x \rightarrow 0} \frac{\sin x}{x} \times \frac{1}{2} = \frac{1}{2} \times \lim_{x \rightarrow 0} \frac{\sin x}{x} = \frac{1}{2} \times 1 = \textcircled{\frac{1}{2}}$$

$$\lim_{x \rightarrow 0} \frac{\sin 3x}{4x} = \lim_{x \rightarrow 0} \frac{\sin 3x}{x} \times \frac{1}{4} \times \frac{3}{3} = \lim_{x \rightarrow 0} \frac{\sin 3x}{3x} \times \frac{1}{4} \times \frac{3}{1} = \frac{3}{4} \times \lim_{x \rightarrow 0} \frac{\sin 3x}{3x} = \frac{3}{4} \times 1 = \textcircled{\frac{3}{4}}$$

$$\lim_{x \rightarrow 0} \frac{\sin^2 x}{x^2} = \lim_{x \rightarrow 0} \frac{\sin x}{x} \times \frac{\sin x}{x} = 1 \times 1 = \textcircled{1}$$