

$$\sqrt{\frac{1-\cos x}{2}} = \sin \frac{x}{2}$$

Taller Autonomo #3

Nombre: Jeimy Torres Galucin.

$$1) \lim_{x \rightarrow 0} \frac{\sin 10x}{10x}$$

$$\lim_{x \rightarrow 0} \frac{10 \cos 10x}{10}$$

$$\lim_{x \rightarrow 0} \cos 10x$$

$$\lim_{x \rightarrow 0} = \cos(10)(0)$$

$$= 1$$

$$2) \lim_{x \rightarrow 0} \frac{\tan 8x}{x}$$

$$\lim_{x \rightarrow 0} \frac{\sin 8x}{\cos 8x} \cdot \frac{1}{x}$$

$$\lim_{x \rightarrow 0} \frac{8 \sin 8x}{8x} \cdot \frac{1}{\cos 8x}$$

$$\lim_{x \rightarrow 0} \frac{8 \sin 8x}{8x} \cdot \frac{1}{\cos 8x}$$

$$\lim_{x \rightarrow 0} \frac{8}{1} \cdot \frac{1}{\cos 8(0)}$$

$$= \frac{8}{1} = 8$$

$$3) \lim_{x \rightarrow 0} \frac{\tan 5x}{\sin 4x}$$

$$\lim_{x \rightarrow 0} \frac{\sin 5x}{\sin 4x \cos 5x}$$

$$\lim_{x \rightarrow 0} \frac{5 \cos 5x}{4 \cos 4x \cdot \cos 5x + (-5 \sin 5x)(\sin 4x)}$$

$$\lim_{x \rightarrow 0} \frac{5 \cos 5x}{4 \cos 4x \cos 5x - 5 \sin 5x \sin 4x}$$

$$\frac{5 \cos(5 \cdot 0)}{4 \cdot \cos 4(0) \cos 5(0) - 5 \sin 5(0) \sin 4(0)}$$

$$= \frac{5}{4}$$

$$4) \lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$$

$$\lim_{x \rightarrow 0} \frac{d(1 - \cos x)}{d x^2}$$

$$\lim_{x \rightarrow 0} \frac{\sin x}{2x}$$

$$\sin(0)$$

$$= 0$$

$$5) \lim_{x \rightarrow 0} \frac{\sin x}{x^3}$$

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

$$= +\infty$$

$$6) \lim_{x \rightarrow 0} \frac{1 - \cos 2x}{x \sin x}$$

$$\lim_{x \rightarrow 0} \frac{1 - (\cos^2 x - \sin^2 x)}{x \sin x}$$

$$\lim_{x \rightarrow 0} \frac{1 - \cos^2 x + \sin^2 x}{x \sin x}$$

$$\lim_{x \rightarrow 0} \frac{1 - (1 - \sin^2 x) + \sin^2 x}{x \sin x}$$

$$\lim_{x \rightarrow 0} \frac{1 - 1 + \sin^2 x + \sin^2 x}{x \sin x}$$

$$\lim_{x \rightarrow 0} \frac{2 \sin^2 x}{x \sin x}$$

$$\lim_{x \rightarrow 0} \frac{2 \sin x}{x}$$

$$= 2$$

$$7) \lim_{x \rightarrow 0} x \cot 2x$$

$$\lim_{x \rightarrow 0} \frac{x \cos 2x}{\sin 2x}$$

$$\lim_{x \rightarrow 0} \frac{1 \cdot \cos 2x - 2x \sin 2x}{2 \cos 2x}$$

$$\frac{\cos 2(0) - 2(0) \sin 2(0)}{2 \cos 2(0)}$$

$$= \frac{1}{2}$$

$$8) \lim_{x \rightarrow 0} \sqrt{1 - \cos x}$$

$$\sqrt{\lim_{x \rightarrow 0} \frac{\sin x}{2x}}$$

$$\sqrt{\lim_{x \rightarrow 0} \frac{\cos x}{2}}$$

$$\sqrt{\frac{\cos(0)}{2}}$$

$$\sqrt{\frac{1}{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$9) \lim_{x \rightarrow 0} \frac{\ln x}{\ln(\sin x)}$$

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

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

$$= 1 \cdot \frac{1}{\cos(0)} = 1$$

$$10) \lim_{x \rightarrow 0} \frac{\ln(\sin(2x))}{\ln(\sin x)}$$

$$\lim_{x \rightarrow 0} \frac{2 \cos 2x}{\sin 2x} \cdot \frac{\cos x}{\sin x}$$

$$\lim_{x \rightarrow 0} \frac{2 \cos 2x \cdot \cos x}{2 \sin x \cos x \cdot \cos x}$$

$$\lim_{x \rightarrow 0} \frac{\cos 2x}{\cos^2 x}$$

$$\lim_{x \rightarrow 0} \frac{\cos 2(0)}{\cos^2(0)}$$

$$= 1$$