Taller autonomo 3

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1) $\lim_{x \to 0} \frac{\operatorname{sen} 10x}{10x}$

$\frac{10 \cos 10x}{10}$

$\cos 10x$

$\cos(10)(0)$

$= 1$ //

2) $\lim_{x \to 0} \frac{\tan 5x}{\operatorname{sen} 4x}$

$\frac{\operatorname{sen} 5x}{\operatorname{sen} 4x \cos 5x}$

$\frac{5 \cos 5x}{4 \cos 4x \cdot \cos 5x + (-5 \operatorname{sen} 5x)(\operatorname{sen} 4x)}$

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

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

3) $\lim_{x \to 0} \frac{1 - \cos x}{x}$

$\frac{\frac{d}{dx}(1 - \cos x)}{\frac{d}{dx}(x)}$

$\operatorname{sen} x$

$\operatorname{sen}(0)$

0 //

4) $\lim_{x \to 0} \frac{\tan 8x}{x}$

$\frac{\frac{\operatorname{sen} 8x}{\cos 8x}}{x}$

$\frac{8 \operatorname{sen} 8x}{8x} \cdot \frac{1}{\cos 8x}$

$\frac{8}{\cos 8(0)}$

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

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5) $\lim_{x \to 0} \sqrt{\frac{1-\cos x}{x^2}}$

$\sqrt{\lim_{x \to 0} \frac{\operatorname{sen} x}{2x}}$

$\sqrt{\frac{\cos x}{2}}$

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

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

6) $\lim_{x \to 0} \frac{\operatorname{sen} x}{x^2}$

$\frac{\operatorname{sen} x}{x} \cdot \frac{1}{x^2}$

$1 \cdot \infty$

$= +\infty$ //

7) $\lim_{x \to 0} \frac{1-\cos 2x}{x \operatorname{sen} x}$

$\frac{1-(\cos^2 x - \operatorname{sen}^2 x)}{x \operatorname{sen} x}$

$\frac{1-\cos^2 x + \operatorname{sen}^2 x}{x \operatorname{sen} x}$

$\frac{1-(1-\operatorname{sen}^2 x)+\operatorname{sen}^2 x}{x \operatorname{sen} x}$

$\frac{2\operatorname{sen}^2 x}{x \operatorname{sen} x}$

$2 \cdot \frac{\operatorname{sen} x}{x}$

$= 2$ //

8) $\lim_{x \to 0} \frac{\ln(\operatorname{sen}(x))}{\ln(\operatorname{sen}(x))}$

$\frac{\frac{1}{x}}{\frac{1}{\operatorname{sen} x} \cdot \cos x}$

$\frac{\operatorname{sen} x}{x} \cdot \frac{1}{\cos x}$

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

9) $\lim_{x \to 0} x \cot 2x$

$x \cdot \frac{\cos 2x}{\operatorname{sen} 2x}$

$\frac{1 \cdot \cos 2x - 2x \operatorname{sen} 2x}{2 \cos 2x}$

$\frac{\cos 2(0) - 2(0) \operatorname{sen} 2(0)}{2 \cos 2(0)}$

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

10) $\lim_{x \to 0} \frac{\ln(\operatorname{sen}(2x))}{\ln(\operatorname{sen} x)}$

$\frac{2 \cos 2x}{\operatorname{sen} x} \cdot \frac{\cos x}{\operatorname{sen} x}$

$2 \cos 2x \cdot \operatorname{sen} x$

$2 \operatorname{sen} x \cos x \cdot \cos x$

$\frac{\cos 2x}{\cos^2 x} = \frac{\cos 2(0)}{\cos(0) \cdot \cos(0)}$

$= 1$ //