Angie Esquivel López. 2023088908

1- $\lim\limits_{x \to +\infty} \sqrt{9x^2+1} - 3x$

$= \lim\limits_{x \to +\infty} \sqrt{9x^2+1} - 3x \quad \cdot \; (+\infty - +\infty)$ EXP indef.

$= \lim\limits_{x \to +\infty} \sqrt{9x^2+1} - 3x \cdot \dfrac{\sqrt{9x^2+1} + 3x}{\sqrt{9x^2+1} + 3x}$

$= \lim\limits_{x \to +\infty} \dfrac{9x^2+1 - (3x)^2}{\sqrt{9x^2+1} - 3x}$

$= \lim\limits_{x \to +\infty} \dfrac{x^2(9-9)+1}{\sqrt{9x^2+1} - 3x} = \lim\limits_{x \to +\infty} \dfrac{x^2(0)+1}{\sqrt{9x^2+1} - 3x}$

$= \lim\limits_{x \to +\infty} \dfrac{1}{\sqrt{9x^2+1} - 3x} \cdot \dfrac{\sqrt{9x^2+1} + 3x}{9x^2+1+3x} = \lim\limits_{x \to +\infty} \dfrac{1 \cdot \sqrt{9x^2+1} + 3x}{9x^2+1-3x} = 0$

2. $f(x) = \cos(x - \pi)$ calcular $f'(\pi)$

$\boxed{\lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{h}}$

$\lim\limits_{h \to 0} \dfrac{\cos((x+h) - \pi) - \cos(x - \pi)}{h}$

$= \lim\limits_{h \to 0} \dfrac{\cos((\cos(x) \cdot \cos(h) - \operatorname{sen}(x) \cdot \operatorname{sen}(h)) - \pi) - \cos(x - \pi)}{h}$

$= \lim\limits_{h \to 0} \dfrac{\cos(\cos(x) \cdot \cos(h)) \cdot \overset{-1}{\cos(\pi)} - \overset{0}{\operatorname{sen}(\operatorname{sen}(x) \cdot \operatorname{sen}(h))} \cdot \overset{0}{\operatorname{sen}(\pi)} - \cos(x - \pi)}{h}$

$= \lim\limits_{h \to 0} \dfrac{\cos(\cos(x) \cdot \cos(h)) \cdot -1 - (\cos(x) \cdot \overset{-1}{\cos(\pi)} + \overset{0}{\operatorname{sen}(x) \cdot \operatorname{sen}(\pi)})}{h}$

$= \lim\limits_{h \to 0} \dfrac{-\cos(\cos(x) \cdot \cos(h)) - (-\cos(x))}{h}$

$= \lim\limits_{h \to 0} \dfrac{-\cos(\cos(x) \cdot \cos(h)) + \cos(x)}{h}$

3)

producto $= [g(x)]' \cdot h(x) + g(x) \cdot [h(x)]'$

cociente $= \dfrac{[g(x)]' \cdot h(x) - g(x) \cdot [h(x)]'}{h(x)^2}$

$$f(x) = \frac{2^x \cdot (x^2-3x)}{\tan(x)}$$

$$= \frac{(2^x \cdot \ln(2) \cdot (x^2-3x) + 2^x \cdot 2x-3)'}{\tan(x)}$$

$$= \frac{2^x\,(1 \cdot \ln(2) \cdot (x^2-3x) + 1 \cdot 2x-3)}{\tan(x)^2}$$

$$= \frac{2^x \cdot \ln(2) \cdot (1 \cdot \ln(2) \cdot (x^2-3x) + 1 \cdot 2x-3) - 2^x \cdot (1 \cdot \ln(2) \cdot (x^2-3x + 1 \cdot 2x-3}{\tan^2(x)}$$