Erick Vásquez Murillo | B98334 | Examen II

1e) $\lim_{x \to 1} \frac{\ln(2x^2-1)}{\tan(x-1)}$

$L = \lim_{x \to 1} \frac{\ln(2x^2-1)}{\tan(x-1)}$

$\ln(L) = \ln\left[\lim_{x \to 1} \frac{\ln(2x^2-1)}{\tan(x-1)}\right]$

$\ln(L) = \lim_{x \to 1}\left[\ln\left\{\frac{\ln(2x^2-1)}{\tan(x-1)}\right\}\right]$

$\ln(L) = \lim_{x \to 1}\left[\ln\left\{\frac{1}{2x^2-1} \cdot \sec^2(x-1)\right\}\right]$

$\ln(L) = \lim_{x \to 1}\left[\ln \cdot \frac{1}{2x^2-1} \cdot 2\sec(x-1) \cdot \sec(x-1)\right]$

$\ln(L) = \lim_{x \to 1}\left[2\ln \cdot \frac{1}{2x^2-1} \cdot \frac{1}{\cos(x-1)} \cdot \frac{1}{\cos(x-1)}\right]$

$\ln(L) = \lim_{x \to 1}\left[\frac{2\ln(1 \cdot 1 \cdot 1)}{2x^2-1 \cdot \cos(x-1) \cdot \cos(x-1)}\right]$

// L' hôpital

$\ln(L) = \lim_{x \to 1}\left[\frac{2 \cdot 1}{4x \cdot -\sin(x-1) \cdot -\sin(x-1)}\right]$

$\ln(L) = \lim_{x \to 1}\left[\frac{2}{-\sin(x-1)(4x \cdot 1 \cdot 1)}\right]$

$$\ln(L) = \lim_{x \to 1} \left[\frac{2}{-\sin(x-1)(4)} \right] = 1$$

$$\ln(L) = 1$$

$$L = e^{1} = \boxed{e}$$

R/ $\lim_{x \to 1} \frac{\ln(2x^2 - 1)}{\tan(x-1)} = e$ //

II) $\lim_{x \to 0} (1 + \tan(x))^{\csc(x)}$

$$L = \lim_{x \to 0} (1 + \tan(x))^{\csc(x)}$$

$$\ln(L) = \ln\left[\lim_{x \to 0} (1 + \tan(x))\right]^{\csc(x)}$$

$$\ln(L) = \lim_{x \to 0} \left[\ln(1 + \tan(x))\right]^{\csc(x)}$$

$$\ln(L) = \lim_{x \to 0} \left[\csc(x) \cdot \ln(1 + \tan(x))\right]$$

$$\ln(L) = \lim_{x \to 0} \left[\frac{1}{\operatorname{sen}(x)} \cdot \frac{1}{1 + \tan(x)} \right]$$

$$\ln(L) = \lim_{x \to 0}\left[\frac{1}{\text{sen}(x) \cdot \tan(x)}\right]$$

$$\ln(L) = \lim_{x \to 0}\left[\frac{1}{\frac{1}{\cos(x)} \cdot \frac{\text{sen}}{\cos t}}\right]$$

$$\ln(L) = \lim_{x \to 0}\left[\frac{\text{sen}(x)}{2 \cdot \cos(x)}\right] = 0$$

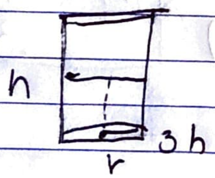
$$\ln(L) = 0$$

$$\boxed{L = e^{0} = 1}$$

R/ $= \lim_{x \to 0} (1 + \tan(x))^{\cos(x)}$

$= 1$ //

2e)



$r = 3h$

Diagrama

$\frac{dV}{dt} = -16\ cm^2/h \quad | \quad r = 3$

$$\boxed{\frac{dV}{dt} = ?}$$

Volumen Cilindro

Comenzar a derivar

$V = \pi r^2 h$

$V = \pi (3h)^2 \cdot h$

$V = \pi 3h^3$

Calcular ¿h?

$$V = \pi r^2 h$$

$$-16 = \pi \cdot 3^2 \cdot h$$

$$-16 = \pi \cdot 9 \cdot h$$

$$\frac{-16}{9\pi} = h$$

$$\boxed{-0{,}56 = h}$$

$$\frac{dV}{dt} = \pi\, 3h^3 \cdot \frac{dh}{dt}$$

$$\frac{dV}{dt} = \pi\, 3 \cdot \left(-\frac{14}{25}\right)^3 \cdot \frac{dh}{dt}$$

$$\frac{dV}{dt} = \pi \cdot 3 \left(\frac{-2744}{15625}\right)$$

$$\boxed{\frac{dV}{dt} = -1{,}65\ cm^2/h}$$

R/ La rapidez en que disminuye es de $-1{,}65\ cm^2/h$

3.C)

$$y^2 = 2x^3 \qquad 4x - 3y + 1 = 0$$

$$y = \frac{4x}{3} + \frac{1}{3}$$

// Buscamos

$$y = mx + b$$

$$\frac{4}{3} = m = (2x^3)\Big|_{(x_0, y_0)} \qquad \boxed{m = \frac{4}{3}}$$

$$\frac{4}{3} = 6x_0$$

$$\frac{4}{3} \div 6 = x_0$$

$$\boxed{\frac{2}{9} = x_0}$$

// Buscamos y_0 en en la recta tangent

$$f\left(\frac{2}{9}\right) = \sqrt{2\left(\frac{2}{9}\right)^3} = 2/27$$

// Entonces ~~l~~os puntos son: $\left(\frac{2}{9}, \frac{2}{27}\right)$

i) $m_T = \frac{4}{3}$ $\qquad$ $m_N = \frac{3}{4}$

i) Tangente

$$y = \frac{4}{3}\left(x - \frac{2}{9}\right) + \frac{2}{27}$$

$$y = \frac{4}{3}x - \frac{8}{27} + \frac{2}{27}$$

$$\boxed{y = \frac{4}{3}x + \frac{10}{27}}$$

ii) Normol

$$y = \frac{3}{4}\left(x - \frac{2}{9}\right) + \frac{2}{27}$$

$$y = \frac{3}{4}x + \frac{1}{3} + \frac{2}{27}$$

$$\boxed{y = \frac{3}{4}x + \frac{11}{27}}$$

//.

40) $g(x) = 6x^4 - 8x^3 - 3x^2 + 6x + \frac{2}{3}$

en $[0,2]$

// Punto critico $g'(x) = 0$

$g'(x) = 24x^3 - 24x^2 - 6x + 6$

$= 24x^3 - 24x^2 - 6x + 6 = 0$

$x = -1, -0{,}5, 0{,}5$

No es un punto critico por que no esta en el intervalo

// Buscamos valores extremos

- $f(0) = 6(0)^4 - 8(0)^3 - 3(0)^2 + 6(0) + \frac{2}{3}$

$= \frac{2}{3} = 0{,}66$

- $f(2) = 6(2)^4 - 8(2)^3 - 3(2)^2 + 6(2) + \frac{2}{3}$

$= \frac{98}{3} = 32{,}66$

R/ Se tiene un minimo en $[0, \frac{2}{3}]$

y se tiene un maximo en $[0, \frac{98}{3}]$

en el intervalo $[0,2]$

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