Erick Vásquez Murillo → B98334 Examen I

1d) $\lim_{x \to 2} \dfrac{\sqrt[3]{4x} - 2}{x^2 - 4}$

//Evaluar

$$f(2) = \frac{\sqrt[3]{4 \cdot 2} - 2}{2^2 - 4} = \frac{0}{0}$$

//Factorizar $(a-b)(a^2+ab+b^2) = a^3+b^3$

$$\lim_{x \to 2} \frac{(\sqrt[3]{4x} - 2) \cdot ((\sqrt[3]{4x})^2 + \sqrt[3]{4x} \cdot 2 + 2^2)}{x^2 - 4 \cdot ((\sqrt[3]{4x})^2 + \sqrt[3]{4x} \cdot 2 + 2^2)}$$

$$\lim_{x \to 2} \frac{(\cancel{\sqrt[3]{4x}})^{\cancel{3}} - 2^3}{x^2 - 4 \cdot ((\sqrt[3]{4x})^2 + \sqrt[3]{4x} \cdot 2 + 4)}$$

$$\lim_{x \to 2} \frac{4x - 8}{(x+2)(x-2) \; ((\sqrt[3]{4x})^2 + \sqrt[3]{4x} \cdot 2 + 4)}$$ //D. Cuadrado

$$\lim_{x \to 2} \frac{4\cancel{(x-2)}}{(x+2)\cancel{(x-2)}((\sqrt[3]{4x})^2 + \sqrt[3]{4x} \cdot 2 + 4)}$$ // Factor común

$$\lim_{x \to 2} \frac{4}{(x+2) \cdot (\sqrt[3]{4x})^2 + \sqrt[3]{4x} \cdot 2 + 4}$$

//Evaluar

$$f(2) \frac{4}{(2+2) \cdot (\sqrt[3]{4 \cdot 2})^2 + 2 \cdot \sqrt[3]{4 \cdot 2} + 4} = \frac{1}{6}$$

$$\lim_{x \to 2} \frac{\sqrt[3]{4x} - 2}{x^2 - 4} = \frac{1}{6}$$

1K) $\lim_{x \to +\infty} \left(\sqrt{49x^2 - 5x + 2} - 1 - 7x\right)$

// Evaluar = hay que racionalizar

$$\lim_{x \to \infty} \sqrt{49x^2 - 5x + 2} - 1 - 7x \cdot \frac{\sqrt{49x^2 - 5x + 2} + 1 + 7x}{\sqrt{49x^2 - 5x + 2} + 1 + 7x}$$

$$\lim_{x \to \infty} \frac{\left(\sqrt{49x^2 - 5x + 2}\right)^2 - 1 - (7x)^2}{\sqrt{49x^2 - 5x + 2} + 1 + 7x} =$$

$$\lim_{x \to \infty} \frac{49x^2 - 5x + 2 - 1 - (49x^2)}{\sqrt{49x^2 - 5x + 2} + 1 + 7x}$$

$$\lim_{x \to \infty} \frac{\cancel{x^2}\left(49 - 5/x^2 + 2/x^2 - 1/x^2 - 49\right)}{\cancel{x^2}\left(\sqrt{49 - 5/x + 2/x^2} + 1/x^2 + 7/x\right)}$$

$$\lim_{x \to \infty} \frac{49 - 49}{\sqrt{49}} = \frac{0}{\sqrt{49}}$$

---

3C) $f(x) = \frac{2 - \sqrt[3]{10 - x}}{x^2 - 11x + 18}$

// Los posibles puntos están en el denominador

$x^2 - 11x + 18 \to$ Calculadora

$X_1 = 9 \qquad X_2 = 2$

$f(x)$ es continua en $\mathbb{R} - \{9, 2\}$

// Clasificar los puntos

$$\lim_{x \to 9} \frac{2 - \sqrt[3]{10 - x}}{x^2 - 11x + 18}$$

// Punto 9

$$f(9) = \frac{2 - \sqrt[3]{10 - 9}}{9^2 - 11 \cdot 9 + 18} = \frac{1}{0} = \frac{K}{0}$$

// Evaluar

$$f(2) = (2-9) \cdot \left(4 + 2\sqrt[3]{10-2} + \left(\sqrt[3]{10-2}\right)^2\right)$$

$$= -84 \;//$$

R/= Es continuo Evitable.

4C) $f(x) = 2x^2 - \dfrac{5}{x}$ $\qquad \dfrac{f(x+h) - f(x)}{h}$

$$\lim_{h \to 0} \frac{2(x+h)^2 - \frac{5}{x+h} - \left(2x^2 - \frac{5}{x}\right)}{h}$$

$$= \frac{2(x+h)^2 - \frac{5}{x+h} - 2x^2 + \frac{5}{x}}{h}$$

$$= \frac{\cancel{2x^2} + 4hx + 2h^2 - \frac{5}{x+h} - \cancel{2x^2} + \frac{5}{\cancel{x}}}{h}$$

$$= \frac{4hx + 2h^2 - h}{h} \qquad \text{// factor común}$$

$$= \frac{\cancel{h}(4x + 2h - 1)}{\cancel{h}}$$

$$\lim_{h \to 0} 4x + 2h - 1$$

// Evaluar

$$\lim_{h \to 0} = 4 \cdot \cancel{x} + 2 \cdot 0 - 1 = 4x - 1$$

R/ = $f'(x) = 4x - 1$ //

6.c)

$$f(x) = \log(3-2^{-x} - 5x) \cdot e^{\tan^6(-x^2 + \sqrt{3x})}$$

$$= \frac{1}{(3-2^{x}-5x)\cdot \ln(10)} \cdot (2^{-x} \ln(2) - 5) \cdot e^{\tan^6(-x^2+\sqrt{3x})}$$

$$\cdot \sec^{2\cdot 6}\left(-2x + \frac{3}{3x}\right)$$

$$= \frac{2^{-x}\ln(2) - \cancel{5}}{3-2^{x} - \cancel{5}x \cdot \ln(10)} \cdot e^{\tan^6(-x^2+\sqrt{3x})} + \sec^{12}(x) \cdot \left(-2x + \frac{\cancel{3}}{\cancel{3}x}\right)$$

$$= \frac{2^{-x}\ln(2)}{3-2^{x} \cdot \ln(10)} \cdot e^{\tan 6(-x^2+\sqrt{3x})} + \sec^{12}(x) - 2$$

//

7c)

$$y' = \frac{y}{x}(x-2)$$

$$y' = \frac{y(x-2)}{x}$$

$$y' = \frac{yx - 2y}{x}$$

$$y' = \frac{yx - 2}{x}$$

$$g'(x) = -g(x)$$

$$\frac{yx-2}{x} = x \cdot g(x)$$

9.d) $f(x) = \frac{e^x}{x^2}$ , $f'(x) = -f(x) \cdot \ln(x)$

$$\ln(y) = \ln\left(\frac{e^x}{x^2}\right)$$

$$\ln(y) = \ln(e^x) - \ln(x^2)$$

$$\frac{y'}{y} = \frac{e^x}{e^x} - \frac{2x}{x^2} \cdot$$

$$y' = \frac{e^x}{e^x} - \frac{2x}{x^2} \cdot y$$

$$f'(x) = - f(x) \cdot \ln(x)$$

$$f(x)' = \frac{\cancel{e^x} \cdot \cancel{x^2} - e^x \cdot 2x}{\cancel{e^x} \cdot \cancel{x^2}}$$

$$f(x) = \frac{-e^x}{x^2}$$

$$\frac{e^x}{x^2} \cdot y' = -\frac{e^x}{x^2} \cdot \ln(x)$$

Entonces =

$$\frac{ex}{e^x} - \frac{2x}{x^2} \cdot y' = -\frac{e^x}{x^2} \cdot \ln(x)$$

//