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Nombre del profesor: Juan José Ojeda Trujillo

Nombre del trabajo: Problemario

Materia: Calculo

Grado: 4

Grupo: A

A 03 de junio del 2023. Comitán de Domínguez, Chiapas .

Problemario 2

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① $y = 2x^3 - 3x + 9$

$y + \Delta y = 2(x + \Delta x)^3 - 3(x + \Delta x) + 9$

$y + \Delta y = x^3 + 3x^2\Delta x + 3x\Delta x^2 + \Delta x^3$

$y + \Delta y = 2x^3 + 6x^2\Delta x + 6x\Delta x^2 + 2\Delta x^3 - 3x + 3\Delta x + 9$

$-y = -2x^3 + 3x - 9$

$\Delta y = 6x^2\Delta x + 6x\Delta x^2 + 2\Delta x^3 + 3\Delta x$

$\frac{\Delta y}{\Delta x} = \frac{6x^2\Delta x}{\Delta x} + \frac{6x\Delta x^2}{\Delta x} + \frac{2\Delta x^3}{\Delta x} + \frac{3\Delta x}{\Delta x}$

$\frac{\Delta y}{\Delta x} = 6x^2 + 6x\Delta x + 2\Delta x^2 + 3$

$\lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x} = 6x^2 + 6x^2 + 2\Delta x + 3$

$\frac{dy}{dx} = 6x^2 + 3$

② $y = \frac{4}{x^2}$

$y + \Delta y = \frac{4}{(x + \Delta x)^2}$

$y + \Delta y = \frac{4}{x^2 + 2x\Delta x + \Delta x^2}$

$y + \Delta y - y = \frac{4}{x^2 + 2x\Delta x + \Delta x^2} - \frac{4}{x^2}$

$\Delta y = \frac{4x^2 - (4x^2 + 8x\Delta x + 4\Delta x^2)}{x^4 + 2x^3\Delta x + x^2\Delta x^2}$

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

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

$\lim_{\Delta x \to 0}$

$\frac{dy}{dx} = \frac{-8x}{x^4}$

$\frac{dy}{dx} = \frac{-8}{x^3}$

$\frac{dy}{dx} = -\frac{8}{x^3}$

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(3) $y = \frac{5}{4} + x^2$

$y + \Delta y = \frac{5}{4 + (x+\Delta x)^2} - \frac{5}{4} + x^2$

$\Delta y = \frac{20 + 5x^2 - 20 + 5(x+\Delta x)^2}{16 + 4(x+\Delta x)^2 + 4x^2 + x^2(x+\Delta x)^2}$

$\frac{\Delta y}{\Delta x} = \frac{10x}{16 + 4x^2 + 8x\Delta x + 4\Delta x^2 + 4x^2 + x^4 + 2x^3\Delta x + \Delta x^2}$

$\frac{\Delta y}{\Delta x} \quad \frac{10x}{16 + 8x^2 + 8x\Delta x + 4\Delta x^2 + x^4 + 2x^3\Delta x + \Delta x^2}$

$\lim_{\Delta x \to 0}$

$\frac{\Delta y}{\Delta x} = \frac{10x}{16 + 8x^2 + x^4}$

(4) $y = \frac{x+2}{x}$

$-y + y + \Delta y = \frac{1}{1}\frac{x+2}{x+\Delta x} - \left(\frac{1}{1}\frac{x}{x} + \frac{2}{x}\right)$

$-y + y + \Delta y = 1 + \left(\frac{2}{x+\Delta x}\right) - 1 + \left(\frac{2}{x}\right)$

$\frac{-2}{x+\Delta x} \quad \frac{2}{x} \quad \frac{2x - 2x - 2\Delta x}{x^2 + x\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{-2\Delta x}{x^2 + x\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{-2}{x^2 + x\Delta x}$

$\lim_{\Delta x \to 0}$

$\frac{\Delta y}{\Delta x} = \frac{-2}{x^2}$

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⑤ $y = (a - bx)^2$

$(a-bx)(a-bx)$

$a^2 - abx$

$-abx + b^2x^2$

$x^2 - 2abx + b^2$

$y + \Delta y = a^2 - 2ab(x+\Delta x) + b^2(x+\Delta x)^2$

$y + \Delta y = a^2 - 2abx + 2ab\Delta x + b^2x^2 + 2b^2x\Delta x + b^2\Delta x^2$

$y = a^2 + 2abx - b^2x^2$

$\frac{\Delta y}{\Delta x} = \frac{2ab\Delta x}{\Delta x} + \frac{2b^2x\Delta x}{\Delta x} + \frac{b^2\Delta x^2}{\Delta x}$

$\frac{\Delta y}{\Delta x} = 2ab + 2b^2x + b^2\Delta x$

$\lim_{\Delta x \to 0}$

$\frac{\Delta y}{\Delta x} = 2ab + 2b^2x$

⑥ $y = \frac{2}{x^2+4}$

$y + \Delta y = \frac{2}{x^2 + 2x\Delta x + \Delta x^2 + 4}$ $\quad - \frac{2}{x^2+4}$

$\Delta y = \frac{2x^2 + 8 + 2\Delta x^2 - 4x\Delta x - 2\Delta x^2 - 8}{x^4 + 2x^3\Delta x + x^2\Delta x^2 + 4x^2 + 4x^2 + 4x\Delta x + 4\Delta x^2 + 16}$

$\frac{\Delta y}{\Delta x} = \frac{-4x\Delta x + 2\Delta x^2}{x^4 + 2x^3\Delta x + x^2\Delta x^2 + 4x^2 + 4x^2 + 4x\Delta x + 4\Delta x^2 + 16}$

$\frac{\Delta y}{\Delta x} = \frac{-4x + 2\Delta x}{x^4 + 2x^3\Delta x + x^2\Delta x^2 + 8x^2 + 4x\Delta x + 4\Delta x^2 + 16}$

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(7) $y = (1+2x)^2$

$y + \Delta y = 1 + 4(x+\Delta x) + 4(x+\Delta x)^2$

$y + \Delta y = 1 + 4x + 4x\Delta x + 4x + 4x\Delta x + 4x^2$

$\frac{\Delta y}{\Delta x} = \frac{4x\Delta x}{\Delta x} + \frac{4x\Delta x}{\Delta x} + \frac{4\Delta y}{\Delta x}$

$\frac{\Delta y}{\Delta x} = 4x + 4x + 4x^2$

$\boxed{\frac{\Delta x}{\Delta t} = 8x + 4x^2}$

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

$y + \Delta y = \frac{2 - x + \Delta x}{x + \Delta x - 2} - \left(\frac{2-x}{x-2}\right)$

$\Delta y = \frac{-2x - 4 + x^2 + 2x - x\Delta x - 2\Delta x - (2x - x^2 + 2x - x\Delta x - 4 - 2x)}{x^2 - 2x + x\Delta x - 2\Delta x - 2x - 4}$

$\Delta y = \frac{-4 - x\Delta x - 2\Delta x + 4 + x\Delta x}{x^2 - 2x + x\Delta x - 2x - 4}$

$\frac{\Delta y}{\Delta x} = \frac{-2 - 1}{x^2 - 4x + x\Delta x - 4}$

$\boxed{\frac{dy}{dx} = \frac{-12}{x^2}}$