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Parcial: 3

Nombre de la Materia: Cálculo

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Nombre de la Licenciatura: Recursos humanos

Cuatrimestre: cuarto

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$$1. y = 2x^3 - 6x^2 - 7x + 11$$

$$2(x + \Delta x)^3 - 6(x + \Delta x)^2 - 7(x + \Delta x) + 11$$

$$2(x^3 + 3x^2\Delta x + 3x\Delta x^2 + \Delta x^3) - 6(x^2 + 2x\Delta x + \Delta x^2) - 7(x + \Delta x) + 11$$

$$\cancel{2x^3} + 6x^2\Delta x + 6x\Delta x^2 + 2\Delta x^3 - \cancel{6x^2} + 12x\Delta x + 6\Delta x^2 - \cancel{7x} + 7\Delta x + 11$$

$$\Delta y = \frac{6x^2\Delta x}{\Delta x} + \frac{6x\Delta x^2}{\Delta x} + \frac{2\Delta x^3}{\Delta x} + \frac{12x\Delta x}{\Delta x} + \frac{6\Delta x^2}{\Delta x} + \frac{7\Delta x}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = 6x^2 + 6x\Delta x + 2\Delta x^2 + 12x + 6\Delta x + 7$$

$$\frac{\Delta y}{\Delta x} = 6x^2 + \cancel{6x\Delta x} + \cancel{2\Delta x^2} + 12x + \cancel{6\Delta x} + 7$$

Lim $\rightarrow 0$

$$\frac{\Delta y}{\Delta x} = \underline{\underline{6x^2 - 12x - 7}}$$

$$2. \quad y = \frac{11}{4x^3} + \frac{7}{3x^2}$$

$$y + \Delta y = \frac{11}{4(x + \Delta x)^3}$$

$$y + \Delta y = \frac{11}{4(x^3 + 3x^2\Delta x + 3x\Delta x^2 + \Delta x^3)}$$

$$-y + y + \Delta y = \frac{11}{4x^3 + 12x^2\Delta x + 12x\Delta x^2 + 4\Delta x^3} - \frac{11}{4x^3}$$

$$\Delta y = \frac{\cancel{44x^2} - \cancel{44x^2} - 132x^2\Delta x - 132x\Delta x^2 - 44\Delta x^3}{(4x^3 + 12x^2\Delta x + 12x\Delta x^2 + 4\Delta x^3)(4x^3)}$$

$$\frac{\Delta y}{\Delta x} = \frac{-132x^2\cancel{\Delta x} - 132x\Delta x^2 - 44\cancel{\Delta x^3}}{(4x^3 + 12x^2\Delta x + 12x\Delta x^2 + 4\Delta x^3)(4x^3)} \quad [\cancel{\Delta x}]$$

$$\frac{\Delta y}{\Delta x} = \frac{-132x^2 - 132x\Delta x - 44}{(4x^3 + \cancel{12x^2\Delta x} + \cancel{12x\Delta x^2} + \cancel{4\Delta x^3})(4x^3)} \quad \lim_{\Delta x \rightarrow 0}$$

$$\frac{\Delta y}{\Delta x} = \frac{-132x^2 - 44}{(4x^3)(4x^3)}$$

$$\frac{\Delta y}{\Delta x} = \frac{-132x^2 - 44}{(4x^3)^2}$$

$$y = \frac{7}{3x^2}$$

$$y + \Delta y = \frac{7}{3(x + \Delta x)^2}$$

$$y + \Delta y = \frac{7}{3(x^2 + 2x\Delta x + \Delta x^2)}$$

$$-y + y + \Delta y = \frac{7}{3x^2 + 6x\Delta x + 3\Delta x^2} - \frac{7}{3x^2}$$

$$\Delta y = \frac{\cancel{21x^2} - \cancel{21x^2} - 42x\Delta x - 21\Delta x^2}{(3x^2 + 6x\Delta x + 3\Delta x^2)(3x^2)} \quad [\cancel{\Delta x}]$$

$$\frac{\Delta y}{\Delta x} = \frac{-42x\cancel{\Delta x} - 21\Delta x^2}{(3x^2 + 6x\Delta x + 3\Delta x^2)(3x^2)} \quad [\cancel{\Delta x}]$$

$$\frac{\Delta y}{\Delta x} = \frac{-42x - 21\cancel{\Delta x}}{(3x^2 + \cancel{6x\Delta x} + \cancel{3\Delta x^2})(3x^2)} \quad \lim_{\Delta x \rightarrow 0}$$

$$\frac{\Delta y}{\Delta x} = \frac{-42x}{(3x^2)(3x^2)}$$

$$3 \quad y = 11 - 2x^2 - 6x^3$$

$$y = 11 - 2(x^2 + 2x\Delta x + \Delta x^2) - 6(x^3 + 3x^2\Delta x + 3x\Delta x^2 + \Delta x^3)$$

$$y = \frac{11 - 2x^2}{-11 + 2x^2} + 4x\Delta x + 2\Delta x^2 - \frac{6x^3}{+6x^3} + 18x^2\Delta x + 18x\Delta x^2 + 6\Delta x^3 \approx 0$$

$$y = 4x\Delta x + 2\Delta x^2 + 18x^2\Delta x + 18x\Delta x^2 + 6\Delta x^3 \approx \Delta x$$

$$\frac{\Delta y}{\Delta x} = 4x + 2\Delta x + 18x^2 + 18x\Delta x + 6\Delta x^2 \quad \text{Lim} \rightarrow 0$$

$$\frac{\Delta y}{\Delta x} = -4x + 18x^3$$

$$A. \frac{x}{x^2 - 8x} = \frac{\cancel{x}}{\cancel{x}(x-8)} = \frac{1}{x-8}$$

$$y = \frac{1}{(x+\Delta x)-8}$$

$$y = \frac{1}{x+\Delta x-8} - \frac{1}{x-8}$$

$$= \frac{x-8 - x - \Delta x - 8}{(x+\Delta x-8)(x-8)}$$

$$= \frac{-\cancel{\Delta x}}{(x+\Delta x-8)(x-8) \cancel{[\Delta x]}} = \frac{1}{(x+\Delta x-8)(x-8)}$$

$$\lim_{\Delta x \rightarrow 0} = \frac{1}{(x-8)(x-8)} = \boxed{\frac{1}{(x-8)^2}}$$

$$5. \quad y = \frac{5}{(3x-4)}$$

$$y + \Delta y = \frac{5}{3(x+\Delta x) - 4}$$

$$y + \Delta y = \frac{5}{(3x+3\Delta x-4)} - \frac{5}{(3x-4)}$$

$$y + \Delta y = \frac{5(3x-4) - (5)(3x+3\Delta x+4)}{(3x+3\Delta x-4)(3x-4)}$$

$$y + \Delta y = \frac{(5x+20) - (15x+15\Delta x+20)}{(3x+3\Delta x-4)(3x-4)}$$

$$y + \Delta y = \frac{\cancel{5x+20} - 15x - 15\Delta x - \cancel{20}}{(3x+3\Delta x-4)(3x-4)}$$

$$\frac{\Delta y}{\Delta x} = \frac{5x - 15x - \cancel{15\Delta x}}{(3x+3\Delta x-4)(3x-4)} \quad [\Delta x]$$

$$\frac{\Delta y}{\Delta x} = \frac{-10x}{(3x-4)(3x-4)}$$

$$\frac{\Delta y}{\Delta x} = \lim_{x \rightarrow 0} \left[\frac{-10}{(3x-4)^2} \right]$$

$$7. \quad y = \frac{3x^2 + 2}{2x}$$

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

$$= \frac{3(x^2 + 2x\Delta x + \Delta x^2) + 2}{2x + 2\Delta x}$$

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

$$\Delta y = \frac{6x^2 + 12x^2\Delta x + 6x\Delta x^2 + 2\Delta x - 6x^2 - 6x^2\Delta x - 2\Delta x}{(2x + 2\Delta x)(2x)}$$

$$\frac{\Delta y}{\Delta x} = \frac{12x^2\cancel{\Delta x} + 6x\Delta x^2 - 6x^2\cancel{\Delta x} - 4\cancel{\Delta x}}{(2x + 2\Delta x)(2x) [\Delta x]}$$

$$\frac{\Delta y}{\Delta x} = \frac{12x^2 + 6x\Delta x - 6x^2 - 4}{(2x + 2\Delta x)(2x)} \quad \lim_{\Delta x \rightarrow 0}$$

$$\frac{\Delta y}{\Delta x} = \frac{12x^2 - 6x^2 - 4}{(2x)^2}$$

$$10. y = \frac{3}{5x^2} - \frac{3}{4x} + \frac{1}{8}$$

$$y = \frac{3}{5x^2}$$

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

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

$$-y + y + \Delta y = \frac{3}{5x^2 + 10x\Delta x + 5\Delta x^2} - \frac{3}{5x^2}$$

$$\Delta y = \frac{\cancel{15x^2} - \cancel{15x^2} - 30x\Delta x - 15\Delta x^2}{(5x^2 + 10x\Delta x + 5\Delta x^2)(5x^2)}$$

$$\frac{\Delta y}{\Delta x} = \frac{-30x\Delta x - 15\Delta x^2}{(5x^2 + 10x\Delta x + 5\Delta x^2)(5x^2)} \quad [\Delta x]$$

$$\frac{\Delta y}{\Delta x} = \frac{-30x - 15\Delta x}{(5x^2 + 10x\Delta x + 5\Delta x^2)(5x^2)} \quad [\Delta x \rightarrow 0]$$

$$\frac{\Delta y}{\Delta x} = \frac{-30}{(5x^2)(5x^2)} =$$

$$\frac{\Delta y}{\Delta x} = \frac{-30}{(5x^2)^2}$$

$$y = -\frac{3}{4x}$$

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

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

$$-y + y + \Delta y = \frac{\cancel{12x} - \cancel{12x} - 12\Delta x}{(4x + 4\Delta x)(4x)}$$

$$\frac{\Delta y}{\Delta x} = -\frac{\cancel{12x}\Delta}{(4x + 4\Delta x)(4x)} \quad [\Delta x]$$

$$\frac{\Delta y}{\Delta x} = -\frac{12}{(4x + 4\Delta x)(4x)} \quad [\lim \Delta x \rightarrow 0]$$

$$= -\frac{12}{(4x)(4x)}$$

$$\frac{\Delta y}{\Delta x} = \frac{-30x - 12}{(5x^2)^2 (4x)^2}$$

$$6. \frac{(3x+2)}{(2x-1)}$$

$$\Delta y = \frac{3x+3\Delta x+2}{2x+2\Delta x+1} - \frac{3x+2}{2x-1}$$

$$\frac{\Delta y}{\Delta x} = \frac{6x+6\Delta x^2+4x+3x+3\Delta x+2 - 6x^2 - (\Delta x)^2 - 3x - 4x - 2\Delta x - 2}{(2x+2\Delta x+1)(2x+1)}$$

$$\frac{\Delta y}{\Delta x} = \frac{7\Delta x - 4\Delta x}{(2x+\Delta x+1)(2x+1)} \quad \begin{matrix} \Delta x \rightarrow 0 \\ [\Delta x] \end{matrix} \quad \frac{\Delta y}{\Delta x} = \frac{3-4}{(2x+1)^2}$$

$$y = \frac{y+\Delta y}{4+x^2} = \frac{5}{4+x^2+\Delta x^2} = \frac{20+5x^2-20-5x^2-5\Delta x}{(4+x^2+\Delta x^2)^2 (4+x^2)} \quad \Delta x \rightarrow 0$$

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

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

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

$$\frac{\Delta y}{\Delta x} = 4x\cancel{\Delta x} + 2 \quad \leftarrow \quad [\Delta x]$$

$$\frac{\Delta y}{\Delta x} = 4x+2 \quad \Delta x \rightarrow 0$$

$$9. \quad y = (1+2x)^2 = \frac{(1+2x)(1+2x)}{1+2+2+1}$$

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

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

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

$$\Delta y = \cancel{4x^2} + 8x\Delta x + 4\Delta x^2 + 4x + 4\Delta x + \cancel{1}$$

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

Lim $\rightarrow 0$

$$8. \frac{5}{(4+x^2)}$$

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

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

$$\frac{20 + 5x^2 + 20 + 5x^2 + 10x\Delta x + 5\Delta x}{(4 + x^2 + 2x\Delta x + \Delta x^2)(4 + x^2)} [\Delta x]$$

$$\frac{\Delta y}{\Delta x} = \frac{10x\Delta x + 5\Delta x}{(4 + x^2 + 2x\Delta x + \Delta x^2)(4 + x^2)\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{10x + 5}{(4 + x^2)^2} = \frac{15}{(4 + x^2)^2}$$