



**Materia: Calculo**

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

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

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

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

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

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

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

$$\lim_{\Delta x \rightarrow 0} \frac{\Delta y}{\Delta x} = 6x^2 - 12x - 7$$

Resultado

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

$$y + \Delta y = \frac{11}{4(x+\Delta x)^3} + \frac{7}{3(x+\Delta x)^2}$$

$$y + \Delta y = \frac{11}{4(x^3 + 3x^2\Delta x + 3x\Delta x^2 + \Delta x^3)} + \frac{7}{3(x^2 + 2x\Delta x + \Delta x^2)}$$

$$-y + y + \Delta y = \frac{11}{4x^3 + 12x^2\Delta x + 12x\Delta x^2 + 4\Delta x^3} - \frac{11}{4x^3} + \frac{7}{3x^2 + 6x\Delta x + 3\Delta x^2} - \frac{7}{3x^2}$$

$$\Delta y = \frac{11(4x^3 + 12x^2\Delta x + 12x\Delta x^2 + 4\Delta x^3) - 11(4x^3)}{(4x^3 + 12x^2\Delta x + 12x\Delta x^2 + 4\Delta x^3)(4x^3)} + \frac{7(3x^2 + 6x\Delta x + 3\Delta x^2) - 7(3x^2)}{(3x^2 + 6x\Delta x + 3\Delta x^2)(3x^2)}$$

$$\Delta y = \frac{-132x^2\Delta x - 132x\Delta x^2 - 44\Delta x^3}{(4x^3 + 12x^2\Delta x + 12x\Delta x^2 + 4\Delta x^3)(4x^3)} + \frac{-42x\Delta x - 21\Delta x^2}{(3x^2 + 6x\Delta x + 3\Delta x^2)(3x^2)}$$

$$\frac{\Delta y}{\Delta x} = \frac{-132x^2 - 132x\Delta x - 44\Delta x^2}{(4x^3 + 12x^2\Delta x + 12x\Delta x^2 + 4\Delta x^3)(4x^3)} + \frac{-42x - 21\Delta x}{(3x^2 + 6x\Delta x + 3\Delta x^2)(3x^2)}$$

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

$$\frac{\Delta y}{\Delta x} = \frac{132x^2}{(4x^3)^2} + \frac{-42x}{(3x^2)^2}$$

$$\frac{132x^2}{(4x^3)^2} + \frac{-42x}{(3x^2)^2}$$

Resultado

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

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

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

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

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

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

$$\lim_{\Delta x \rightarrow 0} \frac{\Delta y}{\Delta x} = \frac{-42x}{(3x^2)^2}$$



$$3. y = 11 - 2x^2 - 6x^3$$

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

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

$$\cancel{11} - \cancel{2x^2} + 4x\Delta x + 2\Delta x^2 - \cancel{6x^3} + 18x^2\Delta x + 18x\Delta x^2 + \Delta x^3$$

$$\frac{-4x\Delta x}{\Delta x} + \frac{2\Delta x^2}{\Delta x} + \frac{18x^2\Delta x}{\Delta x} + \frac{18x\Delta x^2}{\Delta x} + \frac{16\Delta x^3}{\Delta x}$$

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

$$\lim_{\Delta x \rightarrow 0} \frac{\Delta y}{\Delta x} = -4x + 18x^2 \text{ Resultado}$$

$$4. \frac{x}{x^2 - 8x} = \frac{x}{x(x-8)}$$

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

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

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

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

$$\lim_{\Delta x \rightarrow 0} \frac{1}{(x+\Delta x+8)(x+8)} = \frac{1}{(x+8)^2} \text{ Resultado}$$

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

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

$$\frac{5}{3x+3\Delta x-4} - \frac{5}{3x-4}$$

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

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

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

$$\lim_{\Delta x \rightarrow 0} \frac{15}{(3x-4)^2} \text{ Resultado}$$



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

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

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

$\Delta y = \frac{6x^3 + 12x^2\Delta x + 6x\Delta x^3 + 4\Delta x^3 - 6x^2 - 6x^2\Delta x - 4\Delta x}{(2x + 2\Delta x)^2}$

$\Delta y = \frac{12x^2\Delta x + 6x\Delta x^3 - 6x^2\Delta x - 4\Delta x}{(2x + 2\Delta x)^2 [\Delta x]}$

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

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

8.  $y = \frac{5}{4 + x^2}$

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

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

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

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

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



$$90. \quad y = (1+2x)^2 = \frac{(1+2x)(1+2x)}{1+2x}$$

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

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

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

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

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

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

$$\frac{8x + 4}{\text{Resultado}}$$

$$100. \quad y = \frac{3}{5x^2} - \frac{3}{4x} + \frac{1}{8}$$

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

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

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

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

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

$$\Delta y = -30x - 15\Delta x$$

$$\lim_{\Delta x \rightarrow 0} \frac{-30x - 15\Delta x}{(5x^2 + 10x\Delta x + 5\Delta x^2)(5x^2)}$$

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

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

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

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

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

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

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

$$\lim_{\Delta x \rightarrow 0} = \frac{12}{(4x)^2}$$

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

Respuesta