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**Nombre Del Trabajo: problemario**

**Materia: Calculo**

**Grado: 4 Semestre**

**Grupo: A**

# Problemas

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1.

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

$$Y + DY = 2(x+Dx) - 3(x+Dx) + 9$$

$$Y + DY = 2x^2 + 2x + Dx + 2x + Dx^2 - 3x - 3Dx + 9$$

$$Y + DY = 2x^2 + 2x + Dx + 2x + Dx^2 - 3x - 3Dx + 9$$

$$\frac{DY}{Dx} = \frac{6x^2 + 6x + 2}{Dx} = \frac{2(3x^2 + 3x + 1)}{Dx}$$

$$\frac{DY}{Dx} = 6x^2 + 6x + 2$$

$$\lim_{Dx \rightarrow 0} \frac{DY}{Dx} = 6x^2 + 6x + 2$$

$$\boxed{\frac{DY}{Dx} = 6x^2 + 6x + 2}$$

2.

$$Y = \frac{1}{x^2}$$

$$Y + DY = \frac{1}{(x+Dx)^2}$$

$$Y + DY = \frac{1}{(x^2 + 2x + Dx)^2}$$

$$\boxed{\frac{DY}{Dx} = -\frac{2}{x^3}}$$

$$Y + DY = \frac{1}{(x^2 + 2x + Dx)^2} = \frac{1}{x^4 + 2x^3 + Dx^2}$$

$$DY = \frac{-2x - 4Dx}{x^4 + 2x^3 + Dx^2}$$

$$\frac{DY}{Dx} = \frac{-2x - 4Dx}{x^4 + 2x^3 + Dx^2}$$

$$\lim_{Dx \rightarrow 0} \frac{DY}{Dx} = \frac{-2x}{x^3} = -\frac{2}{x^2}$$

3.  $y = 5x + x^3$

$$y + dy = 5(dx) + 3x^2 dx$$

$$dy = \frac{20 + 6x^2 - 20 + 5(dx) + 3x^2 dx}{16 + 4(dx) + 20x^2 + 4x^2 + 3x^2(dx^2)}$$

$$\frac{dy}{dx} = \frac{10x}{16 + 4(dx) + 20x^2 + 4x^2(dx^2) + 2x^2(dx) + 3x^2(dx^2)}$$

Lim  $\frac{dy}{dx} \rightarrow 0$   $\frac{10x}{16 + 4(dx) + 20x^2}$

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

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

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

$$\frac{2}{x^2 dx} - \frac{2}{x^2} = \frac{2x - 2x + 2 dx}{x^2 + 2x}$$

$$\frac{dy}{dx} = \frac{-2 dx}{x^2 + 2x} (dx)$$

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

Lim  $\frac{dy}{dx} \rightarrow 0$

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

5.-

$$y = (a - bx)^2$$

$$\frac{(a-bx)(a-bx)}{a^2 - abx}$$

$$a^2 - abx$$

$$y + Dy = a^2 - 2ab(x+bx) + b^2(x+bx)^2$$

$$\frac{Dy}{Dx} = \frac{2abbx}{Dx} + \frac{2b^2x^2}{Dx} + \frac{b^2bx}{Dx}$$

$$\frac{Dy}{Dx} = 2ab + 2b^2x + b^2bx$$

$$\lim_{Dx \rightarrow 0} \frac{Dy}{Dx} = 2ab + 2b^2x$$

6.-

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

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

$$Dy = \frac{2x^2 + 8 - 2x^2 - 4ix^2 - 2ix^2 - 8}{x^2 + 2ix^2 + ix^2 + 4ix + 8ix + 4ix^2 + 16}$$

$$\frac{Dy}{Dx} = \frac{-4ix^2 - 2ix^2}{x^2 + 2ix^2 + ix^2 + 4ix + 8ix + 4ix^2 + 16}$$

$$\frac{Dy}{Dx} = \frac{-4ix}{x^2 + 8ix + 16}$$

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

$$y + Dy = 1 + 4(x+Dx) + 4(x+Dx)^2$$

$$y + Dy = \frac{y}{1+2x} + 4Dx + \frac{y^2}{(1+2x)^2} + 4x + 4x^2$$

$$\frac{Dy}{Dx} = \frac{4xy}{1+2x} + \frac{4xy}{1+2x} + \frac{4xy}{1+2x}$$

$$\frac{Dy}{Dx} = 4x + 4x + 4x^2$$

$$\frac{Dy}{Dx} = 8x + 4x^2$$

8. -

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

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

$$Dy = \frac{-2x - 1 + x^2 + 2x - xDx - 2Dx - (2x - x^2 + 2Dx) - (-xDx - y \cdot 2x)}{x^2 - 2x + xDx - 2Dx - 2x + 1}$$

$$\frac{Dy}{Dx} = \frac{-3 - 2Dx}{x^2 - 4x + xDx - 2Dx + 8x}$$

$$\frac{Dy}{Dx} = \frac{-10}{x^2 - 4x + xDx - 2Dx}$$

$$\lim \rightarrow 0$$

$$\frac{Dy}{Dx} = \frac{-10}{x^2}$$