



Mi Universidad

*Nombre del Alumno: Talavera Salto Frida
Alexandra*

Nombre del tema: Problemario

Parcial: Unidad 3

Nombre de la Materia: Calculo

Nombre del profesor: Juan José Ojeda

*Bachillerato Tecnológico en Enfermería
General*

Cuarto semestre

PROBLEMATARIO 2

3/ Junio/23

① $2x^3 - 3x + 9$

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

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

$$\frac{y + \Delta y - y}{\Delta x} = \frac{2x^3 + 6x^2 \Delta x + 12 \Delta x^3 - 3x + 9 - x^3 - 3x^2 \Delta x - 3 \Delta x^2 - \Delta x^3}{\Delta x}$$

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

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

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

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

② $y = \frac{4}{x^2}$

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

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

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

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

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

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

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

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

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

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$$③ y = \frac{5}{4+x^2}$$

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

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

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

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

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

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

$$④ y = \frac{x+2}{x}$$

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

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

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

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

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

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

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

$$\textcircled{5} y = (a - bx)^2$$

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

$$\frac{-abx + b^2x^2}{a^2 - 2abx + b^2x^2}$$

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

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

$$\frac{-y}{-y} = \frac{a^2 - 2abx}{a^2 - 2abx} \quad \frac{-b^2x^2}{-b^2x^2}$$

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

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

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$$\Delta x \rightarrow 0$$

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

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

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

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

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

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

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

$$\textcircled{7} y = (1 + 2x)^2$$

$$(1 + 2x)(1 + 2x)$$

$$\begin{array}{r} 1 + 2x \\ 2x + 4x^2 \\ \hline 1 + 4x + 4x^2 \end{array}$$

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

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

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

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

$$\textcircled{8} y = \frac{2-x}{x-2}$$

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

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

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

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

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

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