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Resolver Ejercicios

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3er p

$$f(x) = 5x^2$$

$$\begin{aligned} f'(x) &= \lim_{\Delta x \rightarrow 0} \frac{f(x+\Delta x) - f(x)}{\Delta x} \quad f(x+\Delta x) = 5(x+\Delta x)^2 = 5(x^2 + 2x\Delta x + \Delta x^2) \\ &= 5x^2 + 10x\Delta x + 5\Delta x^2 = \frac{5x^2 + 10x\Delta x + 5\Delta x^2 - 5x^2}{\Delta x} \\ &= \frac{10x\Delta x + 5\Delta x^2}{\Delta x} = 10x + 5\Delta x \\ \lim_{\Delta x \rightarrow 0} &= 10x + 5(0) = f'(x) = 10x \end{aligned}$$

$$\begin{aligned} f(x) &= 6x^2 + 2x \\ f(x+\Delta x) &= 6(x+\Delta x)^2 + 2(x+\Delta x) = 6(x^2 + 2x\Delta x + \Delta x^2) + 2(x+\Delta x) \\ (x+\Delta x)^2 &= x^2 + 2x\Delta x + \Delta x^2 \\ f(x+\Delta x) &= 6(x^2 + 2x\Delta x + \Delta x^2) + 2x + 2\Delta x = 6x^2 + 12x\Delta x + 6\Delta x^2 + 2x + 2\Delta x \\ &= \frac{6x^2 + 12x\Delta x + 6\Delta x^2 + 2x + 2\Delta x - 6x^2 - 2x}{\Delta x} = \frac{12x\Delta x + 6\Delta x^2 + 2\Delta x}{\Delta x} \\ &= 12x + 6\Delta x + 2 \\ \lim_{\Delta x \rightarrow 0} &= 12x + 6(0) + 2 = f'(x) = 12x + 2 \end{aligned}$$

$$\begin{aligned} f(x) &= \frac{1}{2}x^2 + 3x \quad f(x+\Delta x) = \frac{1}{2}(x+\Delta x)^2 + 3(x+\Delta x) \\ &= \frac{1}{2}(x^2 + 2x\Delta x + \Delta x^2) + 3x + 3\Delta x = \frac{1}{2}x^2 + x\Delta x + \frac{1}{2}\Delta x^2 + 3x + 3\Delta x \\ &= \frac{\frac{1}{2}x^2 + x\Delta x + \frac{1}{2}\Delta x^2 + 3x + 3\Delta x - \frac{1}{2}x^2 - 3x}{\Delta x} = \frac{x\Delta x + \frac{1}{2}\Delta x^2 + 3\Delta x}{\Delta x} \end{aligned}$$

$$\Delta x \left( x + \frac{1}{2}\Delta x + 3 \right) = x + 3 + \frac{1}{2}\Delta x$$

$$\lim_{\Delta x \rightarrow 0} \left( x + 3 + \frac{1}{2}\Delta x \right) = x + 3 + \frac{1}{2}(0) = f'(x) = x + 3$$