

$$\frac{\Delta x (3\Delta x + 8)}{\Delta x} = \lim_{x \rightarrow 0} 3\Delta x + 8 = 3 \cdot 0 + 8 = 8$$

b)  $x_0 = 5$

$$3 \cdot 5^2 - 4 \cdot 5 + 1$$

$$f(5) = 3 \cdot 5^2 - 4 \cdot 5 + 1 = 56$$

$$f(x_0 + \Delta x) = (5 + \Delta x)^2 = 3(5 + \Delta x)^2 - 4(5 + \Delta x) + 1 =$$

$$3(25 + 10\Delta x + 2\Delta x^2) - 4(5 + \Delta x) + 1 =$$

$$\begin{matrix} 3 & 2 & 1 & 3 & 2 & 0 \\ (75 + 30\Delta x + 6\Delta x^2) - 20 - 4\Delta x + 1 = \end{matrix}$$

$$6\Delta x^2 + 26\Delta x + 56 - f(x_0)$$

$$f'(x) = \lim_{\Delta x} \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$$

$$f'(5) = \lim_{\Delta x} \frac{6\Delta x^2 + 26\Delta x + 56 - 56}{\Delta x} = \frac{6\Delta x^2 + 26\Delta x}{\Delta x}$$

$$\frac{\Delta x (6\Delta x + 26)}{\Delta x} = \lim_{x \rightarrow 0} 6\Delta x + 26 = 6 \cdot 0 + 26 = 26$$

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