Recall the limit definition of the derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Take $f(x) = x^2 - 3x$

$$f'(x) = \lim_{h \to 0} \frac{(x+h)^2 - 3(x+h) - (x^2 - 3x)}{h}$$

$$f'(4) = \lim_{h \to 0} \frac{(4+h)^2 - 3(4+h) - (4^2 - 3(4))}{h}$$

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Given $\lim\limits_{h \to 0} \dfrac{3(2+h)^3 - (2+h) + 4 - (3(2)^3 - (2) + 4)}{h}$

a.) $f(x) = 3x^3 - x + 4$

b.) @ $x = 2$

c.) $f'(2) = 35$

$f'(x) = 9x^2 - 1$

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Given $\lim_{h \to 0} \dfrac{2\sin\left(\frac{\pi}{6}+h\right) - 1}{h}$

a.) $f(x) = 2\sin x$

b.) @ $x = \frac{\pi}{6}$

c.) $f'\left(\frac{\pi}{6}\right) = \sqrt{3}$

$f'(x) = 2\cos x \cdot 1$

$f'\left(\frac{\pi}{6}\right) = 2\left(\frac{\sqrt{3}}{2}\right)$

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