

Quiz 5

Find $\frac{d}{dx}2x^2$ using the definition of derivative.

$$\begin{aligned}\text{Solution. } & \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} \\ &= \lim_{h \rightarrow 0} \frac{2(x+h)^2 - 2x^2}{h} \\ &= \lim_{h \rightarrow 0} \frac{2(x^2 + 2xh + h^2) - 2x^2}{h} \\ &= \lim_{h \rightarrow 0} \frac{4xh + 2h^2}{h} = 4x.\end{aligned}$$