

導函數的定義

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

例: $f(x) = x^2$. 求 $f'(x)$

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

$$= \lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h}$$

$$= \lim_{h \rightarrow 0} \frac{x^{\cancel{2}} + 2xh + h^2 - \cancel{x^2}}{h}$$

$$= \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$$

$$= \lim_{h \rightarrow 0} (2x+h)$$

$$= 2x$$

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

$$f(x+h) = (x+h)^2$$