

## Definition of the derivative

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The derivative of  $f(x)$  is defined to be:

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

## Alternative Version

The value of the derivative at  $x = c$  is:

$$f'(c) = \lim_{x \rightarrow c} \frac{f(x) - f(c)}{x - c}$$

## L'Hôpital's Rule

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Consider the function

$$f(x) = \frac{g(x)}{h(x)}$$

If  $\lim_{x \rightarrow c} g(x)$  and  $\lim_{x \rightarrow c} h(x)$  are both 0 or are both  $\pm\infty$ , then

$$\lim_{x \rightarrow c} f(x) = \lim_{x \rightarrow c} \frac{g'(x)}{h'(x)}$$