## **Derivatives** Definition and Notation

f y f x then the derivative is defined to be f x

f 
$$y$$
 f x then all of the following are equivalent notations for the derivative

$$\lim_{h^{\textcircled{B}}} \frac{f x h f x}{h}$$

f y f x all of the following are equivalent notations for derivative evaluated at x a

$$f \quad x \quad y \quad \frac{df}{dx} \quad \frac{dy}{dx} \quad \frac{d}{dx} \quad f \quad x \quad Df \quad x$$

$$f a y \Big|_{x a} \frac{df}{dx} \Big|_{x a} \frac{dy}{dx} \Big|_{x a} Df a$$

## **Interpretation of the Derivative**

f y f x then

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## **Related Rates**

Sketch picture and identify known unknown quantities Write down equation relating quantities and differentiate with respect to t using implicit differentiation *i.e.* add on a derivative every time you differentiate a function of t lug in known quantities and solve for the unknown quantity

