

### $\varepsilon$ - $\delta$ Definition of Derivative

**Definition of derivative:** Let  $f : \mathbb{R} \rightarrow \mathbb{R}$ .  $\frac{df}{dx}(x_0)$  is a number with the property that for any positive number  $\varepsilon$ , we can find a positive number  $\delta$  so that if  $0 < |\Delta x| < \delta$ , then  $\left| \frac{\Delta f}{\Delta x}(x_0, \Delta x) - \frac{df}{dx}(x_0) \right| < \varepsilon$ . Note that if no number has this property, we say that  $f$  is not differentiable at  $x_0$ .