$f(x) \in \sin(x)$

$\frac{d}{dx} f(x) \cdot v \Rightarrow \left. \frac{\sin(x+\varepsilon v) - \sin(x)}{\varepsilon v} \right|_{\varepsilon=0}$

$$\frac{\sin(x)\cos(\varepsilon v) + \cos(x)\sin(\varepsilon v) - \sin(x)}{\varepsilon v}$$

$$= \sin(x)\left[\frac{\cos(\varepsilon v) - 1}{\varepsilon v}\right] + \cos(x)\left[\frac{\sin(\varepsilon v)}{\varepsilon v}\right]$$

$\lim_{z \to 0} \frac{\sin z}{z} = 1 \qquad \lim_{z \to 0} \frac{\cos z - 1}{z} = 0$ ← blood

$$= \sin(x)\left[\cancel{\;}^{0}\right] + \cos(x)\left[\cancel{\;}^{1}\right]$$

$$= \cos(x) \cdot v$$