

$$f(x) = \cos(x)$$

"

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

$$\cos(A+B)$$

"

$$\cos(A)\cos(B) - \sin(A)\sin(B)$$

$$\cos(x+h)$$

"

$$\cos(x)\cos(h) - \sin(x)\sin(h)$$

Cosine Sum Formula

$$\frac{\cos(x+h) - \cos x}{h}$$

$$\frac{\cancel{\cos(x)} \cdot \cos(h) - \sin(x) \cdot \sin(h) - \cancel{\cos(x)}}{h}$$

$$\lim_{h \rightarrow 0} \frac{\cos(h) - \sin(x) \cdot \sin(h)}{h}$$

$$\lim_{h \rightarrow 0} \frac{0 - \sin x - 0}{h}$$

$$\lim_{h \rightarrow 0} \frac{-\sin x}{h}$$

$$-\sin x \cdot \lim_{h \rightarrow 0} \frac{1}{h}$$

$$-\sin x \cdot \frac{1}{0}$$

$$-\sin x \cdot \text{undefined}$$

$$f'(x) = -\sin x$$