

## 2 special limits

"squeeze theorem"

$$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$

$$\lim_{x \rightarrow 0} \frac{\cos x - 1}{x} = 0$$

Q: Derivatives of trig functions?

$$\textcircled{1} \frac{d}{dx} [\sin x] = \lim_{h \rightarrow 0} \frac{\sin(x+h) - \sin x}{h}$$

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

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

$$= \lim_{h \rightarrow 0} \left( \sin(x) \left( \frac{\cos(h) - 1}{h} \right) + \cos(x) \sin(h) \right)$$



















