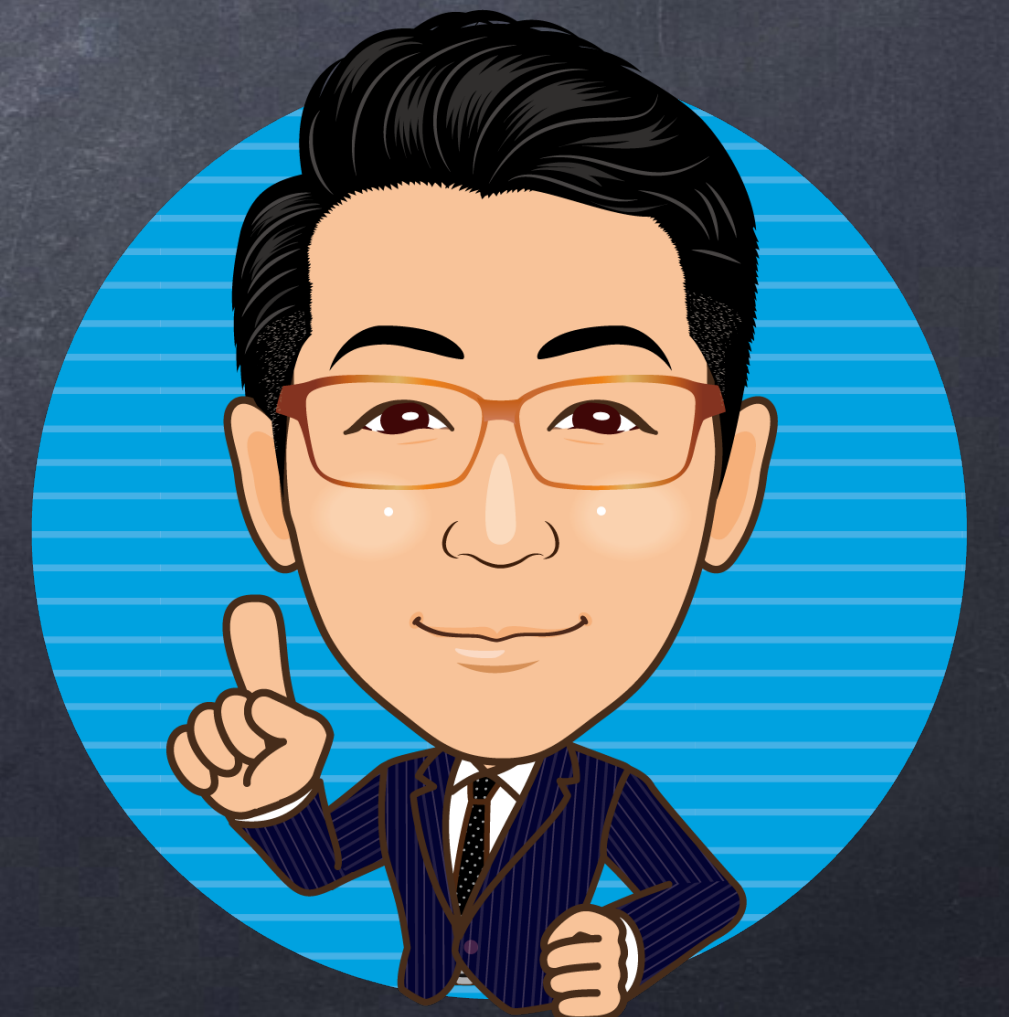


テーマ：
三角関数の導関数



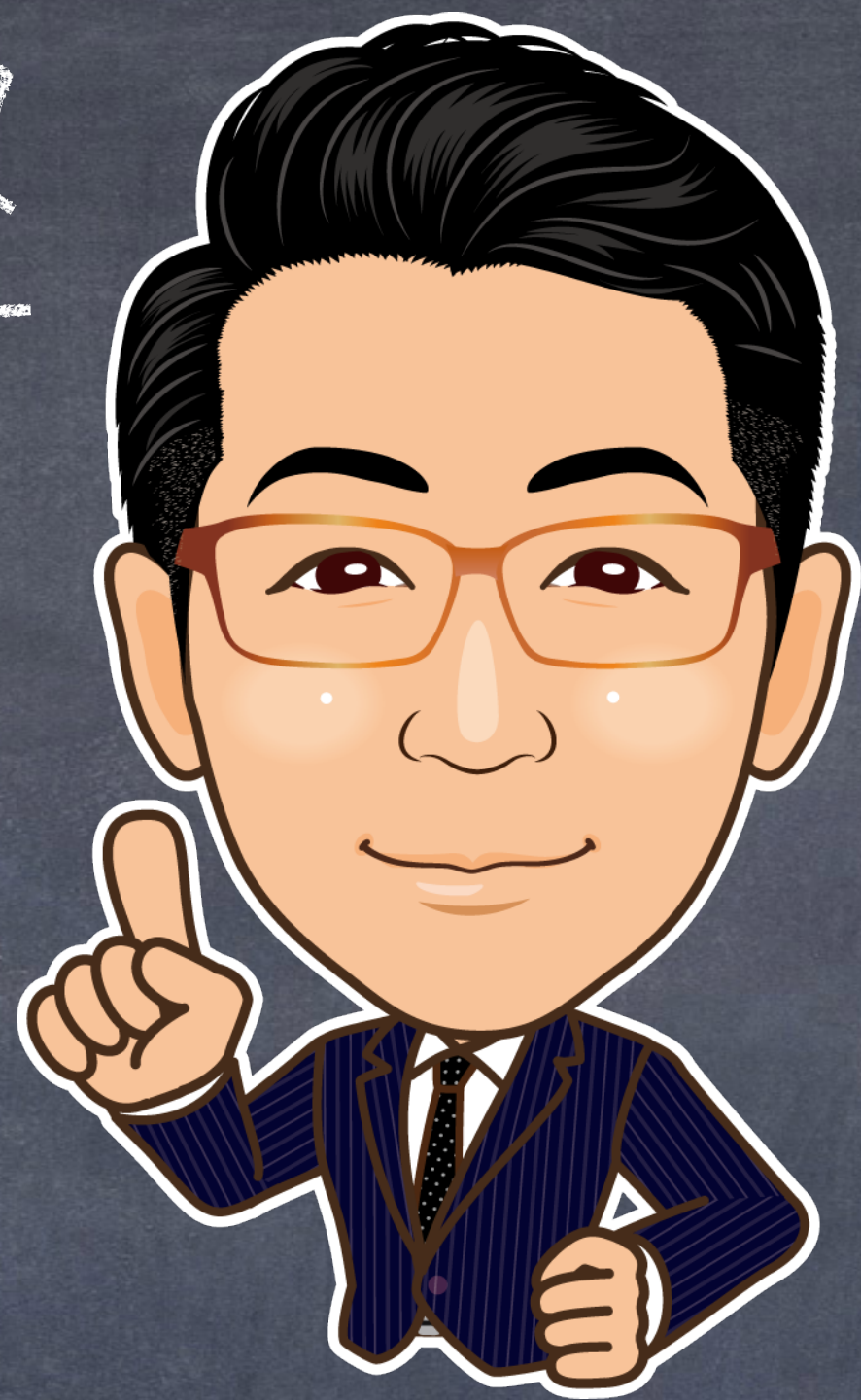
三角関数の導関数

$\sin x$ の導関数

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

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

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



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

$$= \lim_{h \rightarrow 0} \left(\sin x \cdot \frac{\sin^2 h}{h(\cosh + 1)} + \cos x \cdot \frac{\sin h}{h} \right)$$

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

$$= \sin x \cdot 1 \cdot \frac{0}{1+1} + \cos x \cdot 1$$

$$\underline{\underline{(\sin x)' = \cos x}}$$

< 公式 >

$$\textcircled{1} (\sin x)' = \cos x$$

$$\textcircled{2} (\cos x)' = -\sin x$$

$$\textcircled{3} (\tan x)' = \frac{1}{\cos^2 x}$$

(例)

$$(1) y = \sin 3x$$

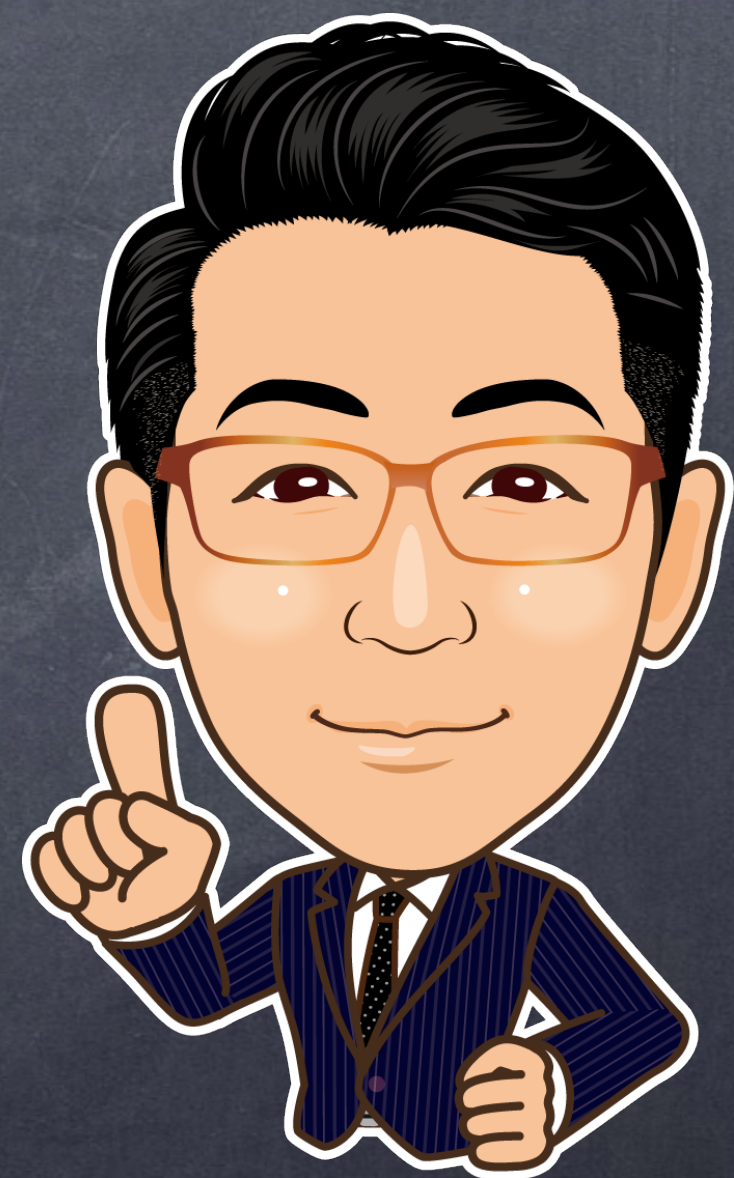
$$y' = \cos 3x \times (3x)' = \underline{\underline{3 \cos 3x}}$$

$$(2) y = \cos^2 x \\ = (\cos x)^2$$

$$y' = 2 \cos x \times (\cos x)'$$

$$= 2 \cos x \times (-\sin x) = -2 \sin x \cos x$$

$$= \underline{\underline{-\sin 2x}}$$



(lx)

(3)

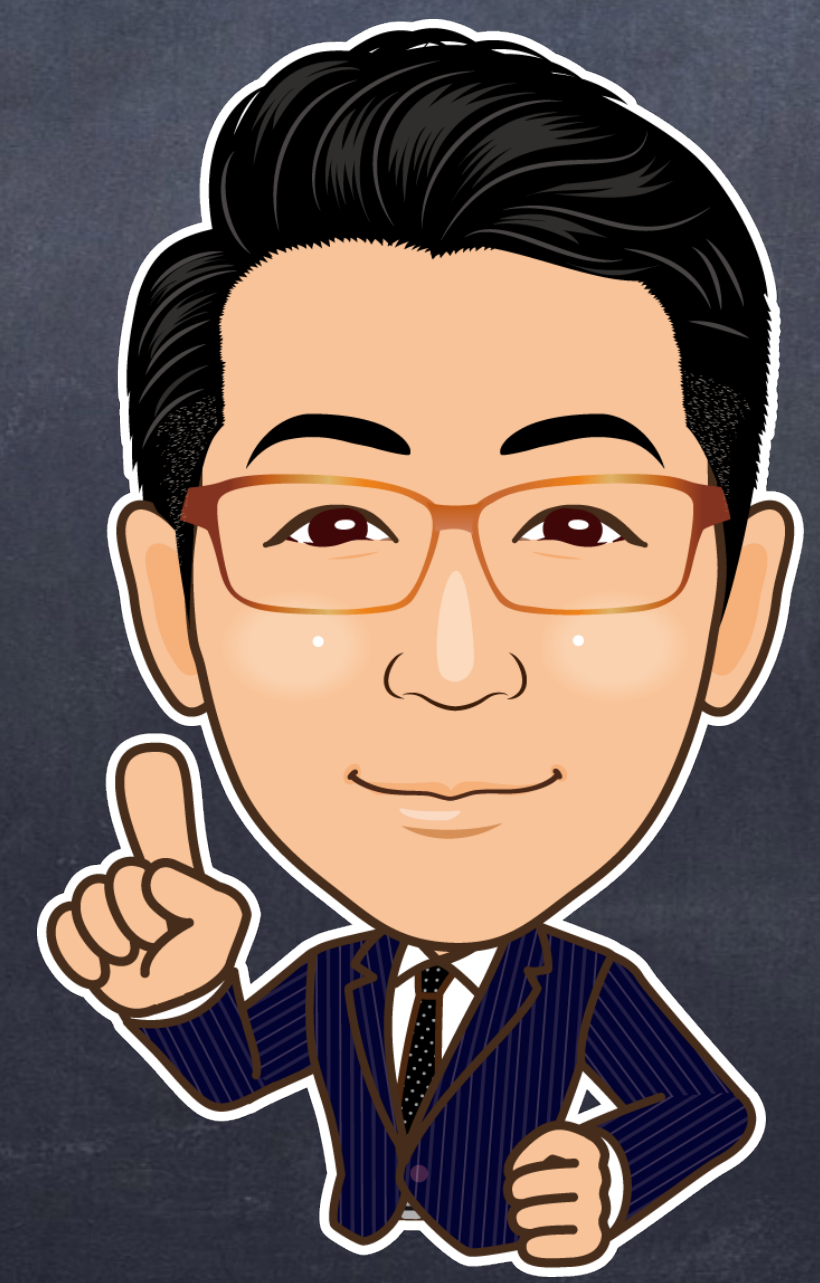
$$y = \frac{1}{\tan \alpha}$$

$$y' = -\frac{1}{\tan^2 \alpha} \times (\tan \alpha)'$$

$$= -\frac{1}{\tan^2 \alpha} \times \frac{1}{\cos^2 \alpha}$$

$$= -\frac{1}{\frac{\sin^2 \alpha}{\cos^2 \alpha}} \times \frac{1}{\cos^2 \alpha}$$

$$= \frac{1}{\sin^2 \alpha}$$



< Point !! >

合成関数の利用

「 \sin 」は Σ と呼ぶ。

⇒ 重要!!