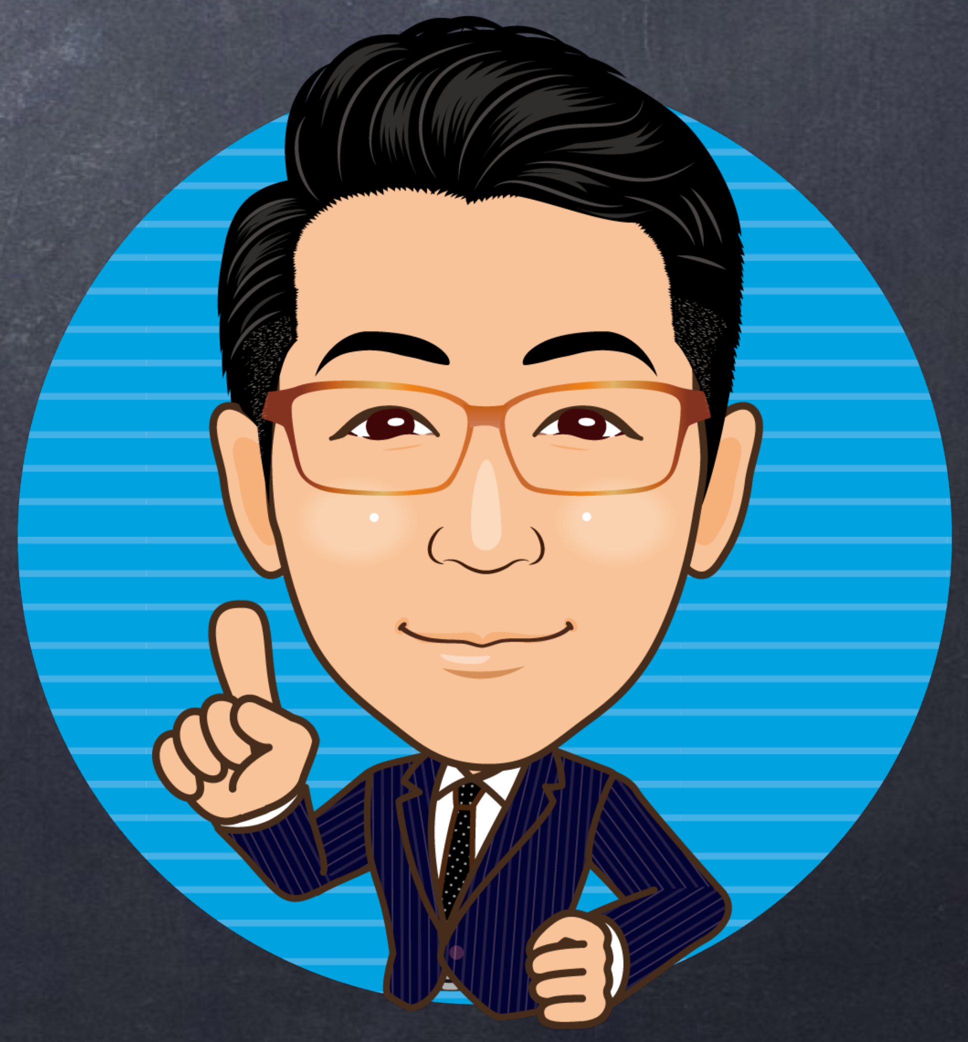
テーマ：

三角関数の導関数（解説）



1 $(\sin x)' = \cos x$

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

$(\tan x)' = \dfrac{1}{\cos^2 x}$ となることを示せ。

2 次の関数を微分せよ。

(1) $y=\sin x+\cos x$

(2) $y=\tan x+x$

(3) $y=\cos 3x$

(4) $y=\sin\left(2x+\frac{\pi}{3}\right)$

(5) $y=\tan 4x$

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

(7) $y=\tan x^3$

(8) $y=\sin^3 x$

(9) $y=\tan^4 x$

(10) $y=x^2\sin 3x^2$

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

(12) $y=\frac{x^2}{\cos x}$

3 次の関数を微分せよ。

$y=\cos^2 4x$

4 次の関数を微分せよ。

(1) $y=\sin^2\left(2x+\frac{\pi}{6}\right)$

(2) $y=\sin\sqrt{x^2-x+1}$

(3) $y=\sin^4 x\cos 4x$

(4) $y=\sqrt{1+\cos^2 x}$

(5) $y=\frac{\cos x}{1-\sin x}$

(6) $y=\left(\tan x+\frac{1}{\tan x}\right)^2$

1 $(\sin x)' = \cos x$

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

$(\tan x)' = \dfrac{1}{\cos^2 x}$ となることを示せ。

$$\lim_{h \to 0} \frac{\cos(x+h) - \cos x}{h}$$

$$= \lim_{h \to 0} \frac{\cos x \cos h - \sin x \sin h - \cos x}{h}$$

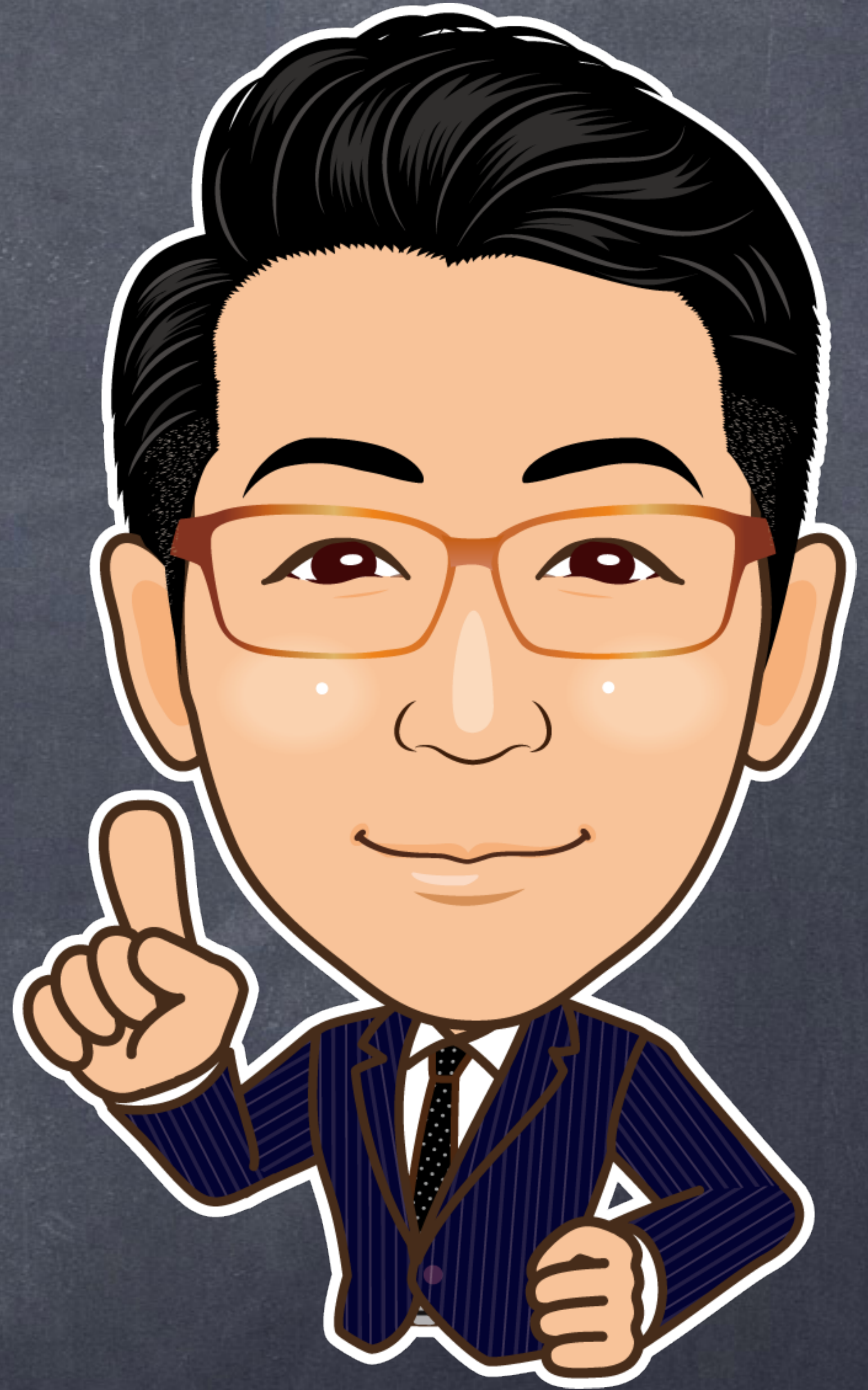
$$= \lim_{h \to 0} \frac{\cos x(\cos h - 1) - \sin x \sin h}{h}$$

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

$$= \cos x \cdot 0 - \sin x \cdot 1$$

$$= -\sin x$$

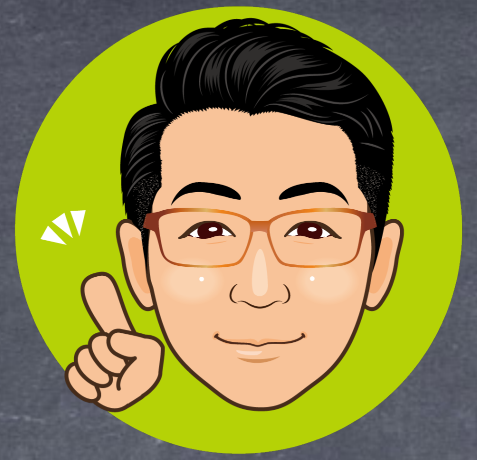
$$(\cos x)' = -\sin x$$



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

(8) $y=\sin^3 x$

指数の位置に注意!!



(6) $y=\cos \boxed{x^2}$

$y'=-\sin x^2 \times (x^2)'$

$y'=-2x\sin x^2$

(8) $y=\sin^3 x$

$=(\boxed{\sin x})^3$

$y'=3\sin^2 x \times (\sin x)'$

$y'=3\sin^2 x\cos x$

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

$$y' = (\sin x)' \cos^2 x + \sin x (\cos^2 x)'$$

$$= \cos x \cos^2 x + \sin x \cdot 2\cos x \cdot (-\sin x)$$

$$= \cos^3 x - 2\sin^2 x \cos x$$

$$y' = \cos^3 x - 2\sin^2 x \cos x$$