New Notation

$g(x) = 2x^3$

$g'(x) = \boxed{6x^2}$

$g''(x) = \boxed{12x}$

$g'''(x) = \boxed{12}$

Leibniz's Notation

Find $\frac{d}{dx}[2x^3] = 6x^2$

$\frac{d}{dx}\left[\frac{d}{dx}[2x^3]\right]$

$= \frac{d^2}{dx^2}[2x^3] = 12x$

$\frac{d^3}{dx^3}[2x^3] = 12$

If $y = \cos x$, $\frac{dy}{dx} = -\sin x$

$\frac{d}{dx}[y]$ → $f'(x)$ or y'

sec(x+h)

Find $\frac{d}{dx}[\sec x]$

$$= \frac{d}{dx}\left[\frac{1}{\cos x}\right] = \frac{\cos x \cdot 0 - 1 \cdot (-\sin x)}{\cos^2 x}$$

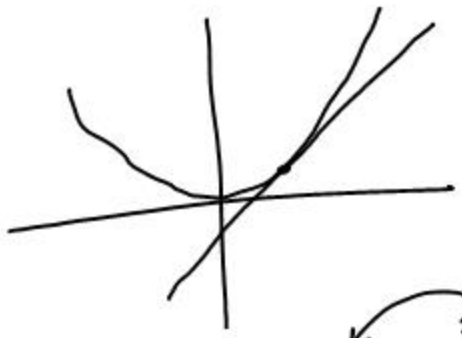
$$= \frac{\sin x}{\cos^2 x}$$

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

$$= \sec x \cdot \tan x$$

$f(x)$	$f'(x)$	
$\sin x$	$\cos x$	] cofunctions
$\cos x$	$-\sin x$	]
$\tan x$	$\sec^2 x$	] cofunctions
$\cot x$	$-\csc^2 x$	]
$\sec x$	$\sec x \tan x$	] cofunctions
$\csc x$	$-\csc x \cot x$	]
e^x	e^x	

"The Big 5"



#21. $y = \sin^2 x = (\sin x)^2$

$$\frac{dy}{dx} = 2(\sin x)^1 \cdot \cos x$$

$$= \sin 2x$$

$y = \sin^2 x$

$y' = 2\sin^1 x \cdot \cos x$

point: $\left(\frac{\pi}{6}, \frac{1}{4}\right)$

slope: $\frac{\sqrt{3}}{2}$

point-slope form

$$y - y_0 = m(x - x_0)$$

$$y - \frac{1}{4} = \frac{\sqrt{3}}{2}\left(x - \frac{\pi}{6}\right)$$

tangent line

Becan's way

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

$\frac{dy}{dx} = \sin x \cos x + \sin x \cdot \cos x$

$= 2\sin x \cos x$

$= \sin 2x$