$\frac{d}{dx}[\sin x] = \cos x$

$\frac{d}{dx}[\cos x]$ :

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

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

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

$$\xrightarrow{h\to 0} \cos(x)\cdot 0 - \sin(x)\cdot 1 = -\sin x$$

$$\frac{d}{dx}[\cos(x)] = -\sin x$$

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

$$= \frac{\cos^2 x + \sin^2 x}{\cos^2 x} = \frac{1}{\cos^2 x} = \sec^2 x = \frac{d}{dx}[\tan x]$$

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

$$= \frac{-\cos x}{\sin^2 x} = -\frac{\cos x}{\sin x}\cdot\frac{1}{\sin x} = -\cot x \csc x$$

$$= -\csc x \cot x = \frac{d}{dx}[\csc x]$$

$\frac{d}{dx}[\cot x]$, $\frac{d}{dx}[\sec x]$ } Very similar

Sep 20-1:32 PM

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$\frac{d}{dx}[\cot x]$, $\frac{d}{dx}[\sec x]$ } Very similar