What you'll Learn About

- How to find the derivative of a composite function

$A)\ \boxed{y=\sin(x)}$

$y' = \cos(x)\cdot 1$

$y' = \cos x$

$B)\ y=\sin\boxed{x^2-4}$

$y' = \cos(x^2-4)\cdot(2x)$

$y' = \cancel{\cos(2x)}$

$C)\ y=\cos^2(3x)$

$y = [\cos(3x)]^2$

$\boxed{y' = 2[\cos(3x)]^1\cdot(-\sin(3x))\cdot 3}$

$= \boxed{-6\cos(3x)\sin 3x}$

$D)\ y=(\csc x)^2\cot x$

$\boxed{y = \boxed{(\csc x)^2}\cot x}$

$y' = (\csc x)^2(-\csc^2 x)\cdot 1 + \cot x\,[2(\csc x)^1\cdot -\csc x\cot x]$

$y' = -\csc^4 x - 2\csc^2 x\cot^2 x$

	E) $y = 5\sqrt{\sin(2x) + \cos(2x)}$ $y = 5\left(\sin(2x) + \cos(2x)\right)^{1/2}$ $y' = \cancel{\frac{5}{2}}\left(\sin(2x) + \cos(2x)\right)^{-1/2} \cdot \frac{5}{2}\left(\cos(2x)\cdot 2 - \sin(2x)\cdot 2\right)$ $\boxed{y' = \frac{5\left(\cos(2x) - \sin(2x)\right)}{\sqrt{\sin(2x) + \cos(2x)}}}$ E) $y = (\sin x + \cos x)^{-2}$ $y = (\sin x + \cos x)^{-2}$ $y' = -2(\sin x + \cos x)^{-3} \cdot (\cos x - \sin x)$ F) $y = \frac{1}{\left(\sin(x^3) + \cos(x^3)\right)^4}$ $y = \frac{1}{\left(\sin(x^3) + \cos(x^3)\right)^4} = \left(\sin(x^3) + \cos(x^3)\right)^{-4}$ ✓ $y' = -4\left(\sin(x^3) + \cos(x^3)\right)^{-5}\left(\cos(x^3)\cdot 3x^2 - \sin(x^3)(3x^2)\right)$ $\boxed{y' = \frac{-12x^2\left(\cos(x^3) - \sin(x^3)\right)}{\sin(x^3) + \cos(x^3)}}$

	L) $y=\sqrt{3x\csc x}$ $y=(3x\csc x)^{1/2}$ $y'=\frac{1}{2}(3x\csc x)^{-1/2}\cdot(3x\cdot -\csc x\cot x+\csc x(3))$ M) $y=3x\sqrt{\csc x}$ $y=(3x)(\csc x)^{1/2}$ $y'=3x\left[\frac{1}{2}(\csc x)^{-1/2}\cdot -\csc x\cot x\right]+(\csc x)^{1/2}\cdot 3$ $y'=-\frac{3}{2}x\csc^{\frac{1}{2}}x\cot x+3(\csc x)^{1/2}$ N) Find y″ if $y=9\cot\left(\frac{x}{3}\right)$