$$\frac{d}{dx}e^x = e^x$$

Taylor series

$$\frac{d}{dx}e^x = \left(1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4 + \frac{1}{120}x^5 + \ldots\right.$$

$$= 1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4 + \ldots$$

$$y = e^{3x}\sin^{-1}(3x-2)$$

$$\boxed{y' = 3e^{3x}\left(\sin^{-1}(3x-2)\right) + e^{3x}\frac{3}{\sqrt{1-(3x-2)^2}}}$$

$$\frac{d}{dx}\left[\sin^{-1}(3x-2)\right]$$

$$\frac{d}{dx}\sin^{-1}(\star) = \frac{1}{\sqrt{1-(\star)^2}}\cdot(\star)'$$

$$= \frac{1}{\sqrt{1-(3x-2)^2}}\cdot\underbrace{(3x-2)'}_{3} = \frac{3}{\sqrt{1-(3x-2)^2}}$$

$$-9 = 3x^2y^3 + x\tan(y) \qquad \text{solve for } \frac{dy}{dx} \; (y')$$

$$0 = 3(2x)y^3 + 3(x^2)(3y^2)\frac{dy}{dx} + \tan(y) + x\sec^2(y)\frac{dy}{dx}$$

$$0 = 6xy^3 + 9x^2y^2\frac{dy}{dx} + \tan y + x\sec^2 y\frac{dy}{dx}$$

$$-9x^2y^2\frac{dy}{dx} - x\sec^2 y\frac{dy}{dx} = 6xy^3 + \tan y$$

$$\boxed{\frac{dy}{dx}} \frac{\cancel{\left[-9x^2y^2 - x\sec^2 y\right]}}{\cancel{-9x^2y^2 - x\sec^2 y}} = \boxed{\frac{6xy^3 + \tan y}{-9x^2y^2 - x\sec^2 y}}$$

$$\boxed{y = x^{2\cos(3x)}}$$

solve for y'

$$\ln(y) = \ln\left(x^{2\cos(3x)}\right)$$

$$\ln(y) = 2\cos(3x)\ln(x)$$

$$\left(\frac{1}{y}\cdot y' = 2\left(-3\sin(3x)\right)\ln(x) + 2\cos(3x)\cdot\frac{1}{x}\right)y$$

$$\boxed{y' = \left[-6\sin(3x)\ln(x) + \frac{2\cos(3x)}{x}\right]\left(x^{2\cos(3x)}\right)}$$

$$\rightarrow \cos(3x) = -\sin(3x)\cdot 3$$

$$\boxed{y = x^2}$$

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

$$\ln(y) = 2\ln(x)$$

$$\frac{1}{y} \cdot y' = 2 \cdot \frac{1}{x}$$

$$y' = \frac{2}{x} \cdot y$$

$$= \frac{2}{x} \cdot x^2 = \boxed{2x}$$