

3.8/3.9 Review

1) Differentiate

$$y = x^{6 \cos x}$$

$$\ln y = \underline{6 \cos x} \underline{\ln x}$$

$$\frac{1}{y} \frac{dy}{dx} = \underline{6(-\sin x)} \ln x + \underline{6 \cos x} \cdot \underline{\frac{1}{x}}$$

$$\begin{aligned} \frac{dy}{dx} &= y \left(-6 \sin x \ln x + \frac{6 \cos x}{x} \right) \\ &= x^{6 \cos x} \left(-6 \sin x \ln x + \frac{6 \cos x}{x} \right) \end{aligned}$$

2) Find $\frac{d}{dx} (\csc^{-1}(3x^4))$

$$u = 3x^4$$

$$\frac{d}{dx} (\csc^{-1} u) = \frac{-1}{|u| \sqrt{u^2 - 1}} \cdot \frac{du}{dx}$$

$$\begin{aligned} \frac{d}{dx} (\csc^{-1}(3x^4)) &= \frac{-1}{|3x^4| \sqrt{(3x^4)^2 - 1}} \cdot 12x^3 \\ &= \frac{-12x^3}{3x^4 \sqrt{9x^8 - 1}} = \frac{-4}{x \sqrt{9x^8 - 1}} \end{aligned}$$