

Chapter 24MATH 200

$$\begin{aligned} \textcircled{2} \quad \frac{d}{dx} \left[\ln \left(x^2 + \frac{1}{x} \right) \right] &= \frac{1}{x^2 + \frac{1}{x}} \frac{d}{dx} \left[x^2 + \frac{1}{x} \right] \\ &= \frac{2x - \frac{1}{x^2}}{x^2 + \frac{1}{x}} = \frac{\frac{2x^3 - 1}{x^2}}{\frac{x^3 + 1}{x}} = \boxed{\frac{2x^3 - 1}{x(x^3 + 1)}} \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad \frac{d}{dx} \left[\frac{1}{x^2 + \ln(x)} \right] &= \frac{d}{dx} \left[(x^2 + \ln(x))^{-1} \right] \\ &= -(x^2 + \ln(x))^{-2} \left(2x + \frac{1}{x} \right) = \boxed{-\frac{2x + \frac{1}{x}}{(x^2 + \ln(x))^2}} \end{aligned}$$

$$\begin{aligned} \textcircled{18} \quad \frac{d}{dx} \left[\ln(\sin(x^3)) \right] &= \frac{1}{\sin(x^3)} \frac{d}{dx} \left[\sin(x^3) \right] \\ &= \boxed{\frac{\cos(x^3) 2x}{\sin(x^3)}} = \boxed{2x \cot(x^3)} \end{aligned}$$