

對數微分法

$$\text{設 } y = \frac{\sqrt[3]{x} \cdot (x^2+2)^8 \cdot e^{7x}}{(2x+1)^5}, \text{ 試求 } y' = ?$$

Sol. 取 $\ln$

$$\begin{aligned}\ln y &= \ln \sqrt[3]{x} + \ln (x^2+2)^8 + \ln e^{7x} - \ln (2x+1)^5 \\ &= \frac{1}{3} \ln x + 8 \ln (x^2+2) + 7x - 5 \ln (2x+1)\end{aligned}$$

$$\frac{1}{y} \cdot y' = \left(\frac{1}{3} \cdot \frac{1}{x} + 8 \cdot \frac{2x}{x^2+2} + 7 - 5 \cdot \frac{2}{2x+1} \right)$$

$$y' = y \left(\frac{1}{3x} + \frac{16x}{x^2+2} + 7 - \frac{10}{2x+1} \right)$$

$$y' = \frac{\sqrt[3]{x} (x^2+2)^8 e^{7x}}{(2x+1)^5} \cdot \left(\frac{1}{3x} + \frac{16x}{x^2+2} + 7 - \frac{10}{2x+1} \right)$$