

ANSWER SHEET

1. Differentiate $g(t) = t^2 - \frac{1}{t^2} + \frac{5}{t^4}$ with respect to t .

Answer: First write all the fractions as powers:

$$g(t) = t^2 - \frac{1}{t^2} + \frac{5}{t^4} = t^2 - t^{-2} + 5t^{-4},$$

and now use the power rule:

$$\begin{aligned} g'(t) &= (t^2)' - (t^{-2})' + 5(t^{-4})', \\ &= 2t - (-2t^{-3}) + 5(-4t^{-5}), \\ &= 2t + 2t^{-3} - 20t^{-5}. \end{aligned}$$

2. Differentiate $f(x) = \frac{\ln x}{x}$ with respect to x .

Answer: Here we use the quotient rule:

$$\begin{aligned} f'(x) &= \left(\frac{\ln x}{x} \right)', \\ &= \frac{x \cdot (\ln x)' - \ln x \cdot (x)'}{x^2}, \\ &= \frac{x \cdot \frac{1}{x} - \ln x \cdot 1}{x^2}, \\ &= \frac{1 - \ln(x)}{x^2}. \end{aligned}$$