

$$(h) f(x) = (e^{3x} + 2)^4$$

$$(f^n)' = n \cdot f^{n-1} \cdot f'$$

$$f'(x) = 4(e^{3x} + 2)^{4-1} \cdot (e^{3x} + 2)'$$

$$= 4(e^{3x} + 2)^3 \cdot e^{3x} \cdot 3$$

$$= 12 \cdot e^{3x} \cdot (e^{3x} + 2)^3$$

$$(i) f(x) = \frac{x^3}{e^x}$$

$$\left(\frac{f}{g}\right)' = \frac{f'g - f \cdot g'}{g^2}$$

$$f'(x) = \frac{3x^2 \cdot e^x - x^3 \cdot e^x}{(e^x)^2} = \frac{e^x(3x^2 - x^3)}{e^x \cdot e^x}$$

$$= \frac{x^2(3-x)}{e^x}$$

$$(j) f(x) = \cos(4x)$$

$$f'(x) = -\sin(4x) \cdot 4 = -4 \sin(4x)$$