

## HW #4

$$\textcircled{1} \quad h(x) = x^{4/3} \cdot f(x)$$

$$h'(x) = \frac{4}{3}x^{1/3} \cdot f(x) + x^{4/3} \cdot f'(x)$$

$$h'(0) = 0 \cdot 5 + 0 \cdot 9 = 0 + 0 = \boxed{0}$$

$$\textcircled{5} \quad m(x) = \frac{1}{f(x)} = [f(x)]^{-1}$$

$$m'(x) = \frac{-1}{[f(x)]^2} \cdot f'(x)$$

$$m'(1) = \frac{-f'(1)}{[f(1)]^2} = \frac{-(-3)}{3^2}$$

$$= \frac{3}{9} = \boxed{\frac{1}{3}}$$

$$\textcircled{2} \quad j(x) = -4f(x) \cdot g(x)$$

$$j'(x) = -4[f'(x) \cdot g(x) + f(x) \cdot g'(x)]$$

$$j'(1) = -4[-3 \cdot 2 + 3 \cdot 6] = -4 \cdot 12 = \boxed{-48}$$

$$\textcircled{3} \quad k(x) = \frac{x f(x)}{g(x)}$$

$$k'(x) = \frac{g(x)[f(x) + x \cdot f'(x)] - x f(x) \cdot g'(x)}{[g(x)]^2}$$

$$k'(-2) = \frac{-5[3 + (-2) \cdot 1] - (-2) \cdot 3 \cdot 8}{(-5)^2} = \frac{-5 + 48}{25} = \boxed{\frac{43}{25}}$$

$$\textcircled{4} \quad l(x) = x^3 \cdot g(x)$$

$$l'(x) = 3x^2 \cdot g(x) + x^3 \cdot g'(x)$$

$$l'(2) = 3(2)^2 \cdot g(2) + (2)^3 \cdot g'(2)$$

$$-48 = 12 \cdot 8 + 8 \cdot g'(2) \Rightarrow g'(2) = \boxed{-18}$$