

1. (a) If $g(x) = \ln(x^6 + 5x + 25)$, then

$$g'(x) = \frac{1}{x^6 + 5x + 25} \cdot (x^6 + 5x + 25)'$$

$$g'(x) = \frac{1}{x^6 + 5x + 25} \cdot (6x^5 + 5)$$

$$g'(x) = \frac{6x^5 + 5}{x^6 + 5x + 25}$$

- (b) If $h(t) = 6t \ln t$, then

$$h'(t) = (6t)' \cdot (\ln t) + (6t) \cdot (\ln t)'$$

$$h'(t) = (6) \cdot (\ln t) + (6t) \cdot \left(\frac{1}{t}\right)$$

$$h'(t) = 6 \ln t + 6$$

- (c) If $W = \frac{6t^2 + 15}{t^5 - 10t}$, then

$$\frac{dW}{dt} = \frac{(6t^2 + 15)' \cdot (t^5 - 10t) - (6t^2 + 15) \cdot (t^5 - 10t)'}{(t^5 - 10t)^2}$$

$$\frac{dW}{dt} = \frac{12t(t^5 - 10t) - (6t^2 + 15)(5t^4 - 10)}{(t^5 - 10t)^2}$$

(d) If $P(t) = t^3 e^{-t}$, then

$$P'(t) = (t^3)' \cdot (e^{-t}) + (t^3) \cdot (e^{-t})'$$

$$P'(t) = (3t^2) \cdot (e^{-t}) + (t^3) \cdot (e^{-t} \cdot (-1))$$

$$P'(t) = 3t^2 e^{-t} - t^3 e^{-t}$$

(e) If $w = (3xe^x)^5$, then

$$\frac{dw}{dx} = 5 (3xe^x)^4 \cdot (3xe^x)'$$

$$\frac{dw}{dx} = 5 (3xe^x)^4 \cdot ((3x)' \cdot (e^x) + (3x) \cdot (e^x)')$$

$$\frac{dw}{dx} = 5 (3xe^x)^4 (3e^x + 3xe^x)$$