



Activity 3.3 – Composite Functions

- (a) $\frac{dL}{dP} = 0.06$ ppm/h; (b) $\frac{dP}{dt} = 4$ h/mo; (c) $\frac{dL}{dt} = \frac{dL}{dP} \cdot \frac{dP}{dt} = (0.06)(4) = 0.24$ ppm/mo
- (a) $y' = 10x^9$
(b) $y' = -12x^{-7}$
(c) $y' = 5(3x)^4 \cdot 3 = 15(3x)^4 = 1215x^4$
(d) $y' = 8(x^3 - 7x^2)^3 \cdot (3x^2 - 14x)$
(e) $y' = -2(x^4 + 6x^2 - 9)^{-3} \cdot (4x^3 + 12x) = \frac{-2(4x^3 + 12x)}{(x^4 + 6x^2 - 9)^3}$
(f) $y' = \frac{1}{5}(2x + 5)^{-4/5} \cdot 2 = \frac{2}{5(2x + 5)^{4/5}}$
(g) $y' = \frac{4}{3}(1 + 2x + 3x^2)^{1/3} \cdot (2 + 6x)$
(h) $y' = -10(1 - 10x)^{-3} \cdot (-10) = \frac{100}{(1 - 10x)^3}$
(i) $y' = \frac{3}{5}(4x^2 + 7)^{-6/5} \cdot 8x = \frac{24x}{5(4x^2 + 7)^{6/5}}$
- (a) $\frac{dy}{dx} = \frac{1}{2\sqrt{5x}} \cdot 5 = \frac{5}{2\sqrt{5x}}$
(b) $\frac{dy}{dx} = -\frac{5}{2\sqrt{2x^2 - 10x}} \cdot (4x - 10) = \frac{-10x + 25}{\sqrt{2x^2 - 10x}}$
- (a) $\frac{dy}{dx} = -\frac{1}{(7x + 2)^2} \cdot 7 = \frac{-7}{(7x + 2)^2}$
(b) $\frac{dy}{dx} = -\frac{7}{(3x^5 - 1)^2} \cdot 15x^4 = \frac{-105x^4}{(3x^5 - 1)^2}$
- (a) $V'(t) = -0.2$, so the volume is decreasing by -0.2 liters per minute.
(b) $P(t) = \frac{nRT}{V(t)} = \frac{(15)(0.08205)(215)}{6 - 0.2t} = \frac{264.61125}{6 - 0.2t}$ atmospheres
(c) $P'(t) = -\frac{264.61125}{(6 - 0.2t)^2} \cdot (-0.2) = \frac{52.92225}{(6 - 0.2t)^2}$ atmospheres per minute
(d) $V(7) = 6 - 0.2(7) = 4.6$ liters; $P(7) = \frac{264.61125}{6 - 0.2(7)} = 57.52418$ atmospheres
(e) $P'(7) = \frac{52.92225}{(6 - 0.2(7))^2} = 2.50105$ atmospheres per minute