LESSON 2.3A

DIFFERENTIATION RULES

FUNDAMENTALS

1. Constant Rule: $\frac{d}{dx}(c) = 0$
2. Power Rule: $\frac{d}{dx}\left(x^n\right) = nx^{n-1}$
3. Constant Multiple Rule: $\frac{d}{dx}\left(c\,f\left(x\right)\right) = c\,f'\left(x\right)$
4. Sum/Difference Rule: $\frac{d}{dx}\left(\,f\left(x\right) \pm g\left(x\right)\right) = f'\left(x\right) \pm g'\left(x\right)$

PROBLEM (LEVEL I)

Find the derivatives. Use appropriate notation.

(a) $y = x^5$

(b) $f(x) = \dfrac{1}{x^3}$

(c) $g(x) = \sqrt{x}$

PROBLEM (LEVEL II)

Find the derivatives. Use appropriate notation.

(a) $f(x) = \dfrac{6}{7x^3}$

(b) $g(x) = -3x^3 - \sqrt[4]{x} + \dfrac{x^7}{2}$

(c) $h(x) = x^2 - 2x + 1$

PROBLEM

The equation of motion of a particle is $s = t^3 - 3t$, where s is in meters and t is in seconds. Find

(a) the velocity and acceleration as functions of t,

(b) the acceleration after 2 sec,

(c) the acceleration when the velocity is 0.

PROBLEM

True or false? Explain why.

(a) $\frac{d}{dx}\left(e^7\right) = 7e^6$ where $e = 2.71828...$

(b) $\frac{d}{dx}\left(\frac{1}{x^3}\right) = \frac{1}{3x^2}$

(c) $\frac{d}{dx}\left(\frac{x}{\pi}\right) = \frac{1}{\pi}$

(d) If $f'(x) = g'(x)$, then $f(x) = g(x)$.