

3.4. DERIVATIVES OF CONSTANTS, POWER FORMS, AND SUMS

For the following c and n represents constant real numbers.

$$(1) \frac{d}{dx}(c) =$$

$$(2) \frac{d}{dx}(x) =$$

$$(3) \frac{d}{dx}(x^n) =$$

$$(4) \frac{d}{dx}(cf(x)) =$$

$$(5) \frac{d}{dx}(f(x) + g(x)) =$$

$$(6) \frac{d}{dx}(f(x) - g(x)) =$$

Examples

Example 3.4.1. Find $\frac{dy}{dx}$ if $y = \sqrt{31}$

Example 3.4.2. Find $\frac{d}{dx}(x^{31})$

Example 3.4.3. Find $\frac{d}{dx}(4x^{31})$

Example 3.4.4. Find $f'(x)$ if $f(x) = \frac{1}{4x^{31}}$

Example 3.4.5. Find $f'(x)$ if $f(x) = \frac{4}{x^{31}}$

Example 3.4.6. Find $f'(x)$ if $f(x) = x^\pi$

Example 3.4.7. Find $\frac{dy}{dx}$ if $f(x) = x^4x^5$

Example 3.4.8. Find $f'(x)$ if $f(x) = \sqrt{31x}$

Example 3.4.9. Find $f'(x)$ if $f(x) = \sqrt{(31x)}$

Example 3.4.10. Find $\frac{dy}{dx}$ if $y = 5x^3 - 2x^2 + 7x - 4$

Example 3.4.11. Find the equation of the line tangent to the graph of $f(x) = (x^3 + 4x)^2$ at $x = 1$.

Example 3.4.12. Find $\frac{d}{dx} (3x^{14} - \frac{1}{14}x^{-12} - 8)$

Example 3.4.13. Find $f'(x)$ if $f(x) = \frac{5x^3 - 2x^2 + 7x - 4}{\sqrt[3]{x}}$

Example 3.4.14. Find $h'(3)$ if $h(x) = 3f(x) - 4g(x) - 9$ and $f(3) = 4$, $f'(3) = -2$, $g(3) = 1$, $g'(3) = 5$.

Example 3.4.15. Find the equation of the line tangent to the graph of $f(x) = x^4 - x^3$ at $(1, 0)$.

Example 3.4.16. Where is $f(x) = x^{2/3}$ differentiable?

Example 3.4.17. Where is $f(x) = x^{4/3}$ differentiable?

Example 3.4.18. Find all value(s) of x for which the graph of $f(x) = -2x^3 + 3x^2 + 36x$ has a horizontal tangent line.

Example 3.4.19. *An object moves along the y-axis (marked in feet) according to the formula $y = 2x^2 - 7x - 6$ where x is the time in seconds. Find the velocity of the object in feet per second when $x = 0$.*

Example 3.4.20 (84). *Suppose that in a given gourmet food store, people are willing to buy x pounds of chocolate candy per day at $\$p$ per quarter pound, as given by the price-demand equation*

$$x = 10 + \frac{180}{p} \quad 2 \leq p \leq 10$$

Find the demand and instantaneous rate of change of demand with respect to price when the price is $\$5$. Interpret.

Homework: 3.4 p. 185 # 1-53 eoo, 71, 77, 81, 83, work e-grade practice at least 2 times.