Techniques of Differentiation

Lecture 14
Section 2.2

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Objectives

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- Differential notation.
- Basic differentiation rules (constants, sums, powers).
- Relative rate of change.

Constant Rule

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Let c be a constant. Then

$$\frac{d}{dx}(c) = 0.$$

Constant Multiple Rule

Constant Multiple Rule

Let $f(x)$ be a function and c be a constant. Then

$$\frac{d}{dx}(cf(x)) = c\frac{d}{dx}(f(x)).$$

Power Rule

Power Rule

Let $f(x)$ be a function and n be any number. Then

$$\frac{d}{dx}(x^n) = nx^{n-1}.$$

Sum and Difference Rules

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Let $f(x)$ and $g(x)$ be functions. Then

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

and

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

Example 2.1.5 Revisited

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Gordon owns a small manufacturing firm. He determines that when x thousand units of one of his products are produced and sold, the profit generated will be

$$P(x) = -400x^2 + 6,800x - 12,000$$

dollars.

(a) Is production profitable when 9,000 units are produced?

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(a) Is production profitable when 9,000 units are produced?

(b) At what rate should Gordon expect profit to be changing with respect to the level of production x when 9,000 units are produced?

(c) Is the profit increasing or decreasing at this level of production?