

The Quotient Rule

Lecture 15
Section 2.3

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Objectives

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- The Quotient Rule.

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

$$\frac{d}{dx} \left(\frac{f(x)}{g(x)} \right) = \frac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2}.$$

Section 2.3, Exercise 51

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A company manufactures a thin DVD burner kit that can be plugged into personal computers. The marketing manager determines that t weeks after an advertising campaign begins, $P(t)$ percent of the potential market is aware of the burners, where

$$P(t) = 100 \left(\frac{t^2 + 5t + 5}{t^2 + 10t + 30} \right).$$

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- (b) At 5 weeks, is the market percentage increasing or is it decreasing?

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- (b) At 5 weeks, is the market percentage increasing or is it decreasing?
- (c) What happens to the market percentage as $t \rightarrow \infty$?

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- (a) At what rate is the market percentage after 5 weeks?
- (b) At 5 weeks, is the market percentage increasing or is it decreasing?
- (c) What happens to the market percentage as $t \rightarrow \infty$?
- (d) What happens to the *rate of change* of market percentage as $t \rightarrow \infty$?

Section 2.3, Exercise 54 (modified)

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The manager of a company estimates that it will cost \$10,000 to produce 400 units of her product 1 year from now and that all those units can then be sold at a price of \$30 per unit. She also estimates that in 1 year, the price will be increasing at the rate of 75 cents per unit per month, while the level of production will be decreasing at the rate of 2 units per month and the cost will stay constant.

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(a) Find the price, production, revenue, and profit $P(t)$ as functions of time?

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- (a) Find the price, production, revenue, and profit $P(t)$ as functions of time?
- (b) Find the rate at which the profit will be changing 1 year from now with respect to t .

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- Find the price, production, revenue, and profit $P(t)$ as functions of time?
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- Will the profit be increasing or decreasing at that time?

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- Will the profit be increasing or decreasing at that time?
- At what rate will the average profit per unit $\frac{P(t)}{x(t)}$ be changing 1 year from now?

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- (c) Will the profit be increasing or decreasing at that time?
- (d) At what rate will the average profit per unit $\frac{P(t)}{x(t)}$ be changing 1 year from now?
- (e) Will the average profit per unit be increasing or decreasing at that time?