Subject for this video: A trick that works for derivatives of some quotients:

## **Rewrite First to Eliminate the Quotient**

**Reading:** 

- General: Section 3.3 Derivatives of Products and Quotients
- More Specifically: Page 199, Example 40

Homework:

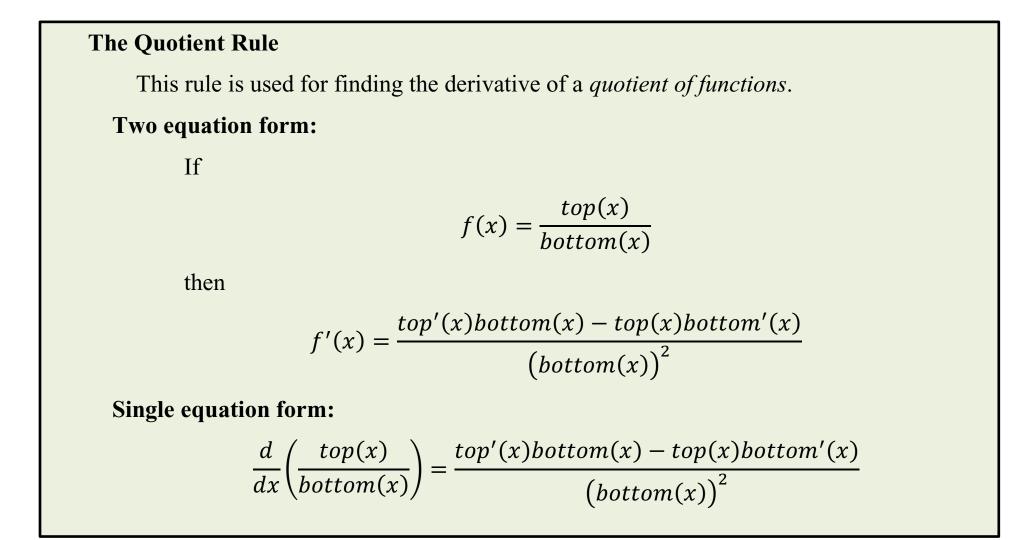
H47: Trick: Rewrite First to Eliminate the Quotient (3.3#59\*,73)

Recall the Derivative Rules that we learned about in previous videos.

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The Constant Function Rule:	$\frac{d}{dx}c = 0$
The Power Rule:	$\frac{d}{dx}x^n = nx^{n-1}$
The Sum and Constant Multiple Rule:	$\frac{d}{dx}(af(x) + bg(x)) = a\frac{d}{dx}f(x) + b\frac{d}{dx}g(x)$
<b>Exponential Function Rule #1:</b>	$\frac{d}{dx}e^{(x)} = e^{(x)}$
<b>Exponential Function Rule #2:</b>	$\frac{d}{dx}e^{(kx)} = ke^{(kx)}$
<b>Exponential Function Rule #3:</b>	$\frac{d}{dx}b^{(x)} = b^{(x)} \cdot \ln(b)$
Logarithmic Function Rule #1:	$\frac{d}{dx}\ln(x) = \frac{1}{x}$
<b>Logarithmic Function Rule #2:</b>	$\frac{d}{dx}\log_b(x) = \frac{1}{x\ln(b)}$
The Product Rule:	$\frac{d}{dx}g(x)\cdot h(x) = g'(x)\cdot h(x) + g(x)\cdot h'(x)$

And the Quotient Rule that we learned about in the previous video



[Example 1] (similar to 3.3#73)

Let 
$$f(x) = \frac{x^7 + 13}{x^7}$$

The goal is to find f'(x) by two methods.

(A) Find f'(x) by using the quotient rule.  $\varsigma'(\chi) = ( \overset{\circ}{2} \chi^7 + 13) \cdot \chi^7 - (\chi^7 + 13) \overset{\circ}{2} \chi^7$ §'(x) = quotient Inle (7x<sup>6</sup>+0) =

Using (ab) = ab. c

(B) Start over. First simplify f(x). Then find f'(x) using easier derivative rules.

$$\begin{aligned} f(x) &= \frac{x^{2} + 13}{x^{2}} = \frac{x^{2}}{x^{2}} t \begin{pmatrix} 13 \\ 13 \end{pmatrix} = 1 + 13x^{7} \\ Convert from \\ Positive exponent from \\ Positive exponent form \\ Positive exponent form \\ Simmand constant form form \\ Simmand constant multiple rule \\ &= 0 + 13 \cdot (-7 \cdot x^{-7-1}) \\ &= 0 + 13 \cdot ($$