

The Derivative of a Quotient

1. Write $E(x) = \frac{7 \ln x}{x}$ as the **quotient** of two functions f and g , where $E(x) = \frac{f(x)}{g(x)}$.

a. $f(x) =$ $\quad f'(x) =$

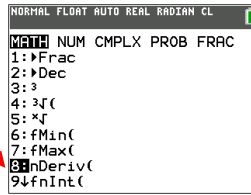
b. $g(x) =$ $\quad g'(x) =$

2. What is your best guess for the derivative of $E(x) = \frac{7 \ln x}{x}$? $E'(x) =$????

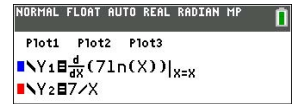


3. Go to Y1 on your calculator.

Press **MATH** **8** for the nDeriv command.



On a TI-84 enter the derivative of $E(x) = \frac{7 \ln x}{x}$ in Y1 using nDeriv. It would look like:

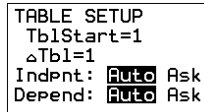


On a TI-83 it would look like:



Enter your guess from # 2 in Y2.

Press **2nd** **TBLSET** **WINDOW** to create a table with these settings.



Press **2nd** **TABLE** **GRAPH**. Do they match?

4. Write $E(x)$ as the **product** of two functions. $E(x) = \frac{7 \ln x}{x} =$ \cdot

Now use the product rule to find $E'(x)$. Then simplify your result for $E'(x)$ so its denominator is a monomial.

(Rearrange your answer to fit expressions in the boxes.)

$$E'(x) = \frac{\boxed{} - \boxed{}}{\boxed{}}$$


5. Can you develop a formula for the derivative of a fractional expression $Q = \frac{u}{v}$ in terms of u , v , u' , and v' ?



Explore.

Important Ideas:

Memory Tip for the Quotient Rule: "Heidi comes second."

$$\frac{d}{dx} \left(\frac{\text{Hi}}{\text{Lo}} \right) = \frac{\text{Lo } \text{dee Hi} - \text{Hi } \text{dee Lo}}{\text{Lo Lo}}$$


From <http://www.foxsports.com/buzzer/story/craziest-moments-in-nfl-history-the-heidi-game-081314>

Check Your Understanding

1. $p(t) = \frac{10t^2}{t^2 + 50}$

2. $y(x) = \frac{3x^2 + 2\sqrt{x}}{x^2}$

3. $y(x) = \frac{3x^2}{4 \ln x}$

4. The table below gives values of f , g , f' , and g' at selected x -values.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	6	5	3	-2
1	3	-3	-1	2
3	1	-2	2	3

Let $h(x) = \frac{f(x)}{g(x)}$. Find $h'(-1)$.