Monday, September 30, 2013 (Day 20)

- Pick up your graded work
- Swipe your I.D.
- Quiz 5 on Friday: Study the Textbook Examples and do the Matched Problems!

Common Mistake on Quiz 4

Replacing $2 \cdot 3^{(x)}$ with $6^{(x)}$. This is incorrect.

Look at the left expression. Two ~~things are~~ operations are indicated. Multiplication + exponent.

The exponent gets done first.

If you replace $2 \cdot 3^{(x)}$ with $6^{(x)}$, it means that you have done the multiplication first. (order of operations mistake)

A couple more examples and Class Drill on Section 4-2 concepts.

Example #4 $f(x) = 12\ln(13)$ find $f'(x)$.

constant function

Solution: $f'(x) = 0$.

Example #5 $f(x) = 12\ln(13x)$ find $f'(x)$.

Solution: must first rewrite $f(x)$ so that we can use Rule#1 or Rule#2 from Friday

Step 1 rewrite $f(x) = 12\ln(13x) = 12(\ln(13) + \ln(x))$

$\ln(ab) = \ln(a) + \ln(b)$

$f(x) = 12\ln(13) + 12\ln(x)$

Step 2 Find the derivative

example #4 example #1

$$f'(x) = \frac{d}{dx}12\ln(13) + \frac{d}{dx}12\ln(x) = 0 + \frac{12}{x} = \frac{12}{x}$$

Work on Class Drill 6

Class Drill 6 Derivatives of Functions Containing Logarithms

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(A) Let $f(x) = 12\ln\left(\frac{13}{x}\right)$. Find $f'(x)$. (Start by rewriting f using a rule of logarithms.)

$\ln\left(\frac{a}{b}\right) = \ln(a) - \ln(b)$

Step 1: rewrite $f(x) = 12\ln\left(\frac{13}{x}\right) = 12(\ln(13) - \ln(x))$

$= 12\ln(13) - 12\ln(x)$

$f'(x) = 0 - \frac{12}{x}$ using results of examples #1 and #4

$f'(x) = \frac{-12}{x}$

(B) Let $f(x) = 12\ln(x^{13})$. Find $f'(x)$. (Start by rewriting f using a rule of logarithms.)

$\ln(a^b) = b\ln(a)$

Step 1: rewrite $f(x) = 12\ln(x^{13}) = 12 \cdot 13 \cdot \ln(x)$

Step 2: derivative $f'(x) = \frac{d}{dx}(12 \cdot 13)\ln(x)$ multiplicative constants

$= (12 \cdot 13)\frac{d}{dx}\ln(x) = (12 \cdot 13)\left(\frac{1}{x}\right) = \frac{12 \cdot 13}{x}$

(C) Let $f(x) = 12x\ln(13)$. Find $f'(x)$.

Step 1: rewrite f with multiplicative constants in front

$f(x) = 12x\ln(13) = 12 \cdot \ln(13) \cdot x$

Step 2: Derivative $f'(x) = \frac{d}{dx}12\ln(13) \cdot x = 12\ln(13)\frac{d}{dx}x = 12\ln(13)(1)$

$f'(x) = 12\ln(13)$

(D) The goal is to find the equation of the line tangent to the graph of the function

$$f(x) = 5 + \ln(x^3)$$

at the point where $x = e^2$.

Remember that the approach is to build the general form of the equation for the tangent line (in point-slope form):

$$\big(y - f(a)\big) = f'(a) \cdot (x - a)$$

Question (D) continues on back. ➔