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Day 16 is Tues Feb 19, 2013

Pick up your graded work.

Resume working on Class Drill 6.

Class Drill 6 Derivatives of Functions Containing Logarithms

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

rule of logs: $\ln\left(\frac{a}{b}\right) = \ln(a) - \ln(b)$

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

Now take derivative

$$f'(x) = \frac{d}{dx} \underbrace{12\ln(13)}_{\text{constant}} - \frac{d}{dx} (12)\ln(x) = 0 - 12 \frac{d}{dx} \ln(x) = -12\left(\frac{1}{x}\right) = -\frac{12}{x}$$

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

rule of logs: $\ln(a^b) = b\ln(a)$

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

Now take derivative

$$f'(x) = 12 \cdot 13 \cdot \frac{d}{dx} \ln(x) \xrightarrow{\text{logarithm rule \#1}} = 12 \cdot 13 \cdot \left(\frac{1}{x}\right) = \frac{156}{x}$$

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

Rewrite $f(x)$ with constant multiples in front

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

Now take derivative

$$f'(x) = \frac{d}{dx} (12\ln(13)) \cdot x \xrightarrow{\text{power rule}} = 12\ln(13) \frac{dx}{dx} = 12\ln(13) \cdot 1 = 12\ln(13)$$

(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):

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

Question (D) continues on back. →

