

Homework #19

Due Friday April 21st in Gradescope by 11:59 pm ET

Goal: Solidify Calculus for the Natural Logarithm

Compute the following Integrals:

$$1. \int_1^2 \frac{1}{8-3x} dx \quad 2. \int_1^e \frac{x^2+x-1}{x} dx \quad 3. \int_4^9 \left(\sqrt{x} + \frac{1}{\sqrt{x}} \right)^2 dx$$

$$4. \int \frac{\sin(\ln x)}{x} dx \quad 5. \int \frac{(\ln x)^2}{x} dx \quad 6. \int \frac{\cos x}{2 + \sin x} dx$$

$$7. \int_{\ln 4}^{\ln 7} \frac{e^x}{1+e^x} dx \quad 8. \int_e^{e^4} \frac{3}{x\sqrt{\ln x}} dx \quad 9. \int_0^{\ln 2} \frac{1}{e^x(1+e^{-x})} dx$$

10. Consider $f(x) = \frac{\ln x}{1+x^2}$. Find $f'(1)$.

11. Compute $\frac{d}{dx} \ln \left(\frac{(x^2+5)^4 e^{\tan x}}{\sqrt{x^3+2}} \right)$. Use Log Algebra to simplify first.

12. Compute $\frac{d}{dx} \ln \left(\frac{(x^2+1)^{\frac{4}{7}} (5-x^9)^8}{e^{\cos x}} \right)$. Use Log Algebra to simplify first.

13. Let $f(x) = x \ln x$ with $x > 0$. Where is $f(x)$ concave up?

Compute each of the following Derivatives using Logarithmic Differentiation:

14. $y = x^x$

15. $y = x^{\sin x}$

16. $y = (\cos x)^x$

REGULAR OFFICE HOURS

Monday: 12:00–3:00 pm

Tuesday: 1:00–4:00 pm

7:30–9:00 pm TA Ellerman, SMUDD **204**

Wednesday: 1:00-3:00 pm

Thursday: none for Professor

7:30–9:00 pm TA Ellerman, SMUDD **207**

Friday: 12:00–2:00 pm

- Check all the Logarithmic Algebra Rules
- Attend Office Hours several times this week