

## Homework #19

Due Wednesday April 15th in Gradescope by 11:59 pm

**Goal:** Solidify Calculus for the Natural Logarithm

Compute the following Integrals:

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

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

7.  $\int_{\ln 4}^{\ln 7} \frac{e^x}{1+e^x} dx$       8.  $\int_e^{e^4} \frac{3}{x\sqrt{\ln x}} dx$       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**

7:30–9:00 pm TA Uchenna, SMUDD 208A

**Tuesday: 1:00–4:00 pm**

**Wednesday: 1:00–3:00 pm**

**Thursday: none for Professor**

4:00–5:30 pm TA Uchenna, SMUDD 208A

**Friday: 12:00–2:00 pm**

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