

## HOMEWORK #18

Review Packet for Exam #3

Due Wednesday, May 4 in Gradescope by 11:59 pm ET.

**Derivatives** Compute the Derivative(s) for each of the following functions.

1.  $y = \ln(\ln(\ln e^x)) + \frac{e}{\ln x} + e \ln x + 5^{\ln e} + \frac{\ln x}{e} + \ln(e^5) + (\ln x) \cdot e^x$

2.  $f(x) = \tan(\ln(1+x^2)) + \ln(1+\cos^2 x) + \frac{5}{\ln(1+x^2)}$

3.  $y = \ln\left(\frac{(x^2+1)^{\frac{4}{7}} e^{\tan x}}{\sqrt{1+\sqrt{x}}}\right)$  Hint: you might want to simplify before differentiating.

4.  $y = 5^x$       5.  $y = (\tan x)^x$  Hint: Logarithmic Differentiation for 4 and 5

6.  $f(x) = \frac{1}{e^{\sin x}} + \frac{e}{\sin(e^x)}$

7.  $g''(x)$ , where  $g(x) = \int_9^x \sqrt{\ln t} + \ln \sqrt{t} dt$ .

8. Find the Absolute Maximum or Minimum value for  $f(x) = \frac{x+2}{e^x}$

**Integration** Compute each of the following integrals.

9.  $\int \frac{(3-\sqrt{x})(3+\sqrt{x})}{x^2} dx$     10.  $\int_e^{e^3} \frac{4}{x(\ln x)^2} dx$     11.  $\int_{\frac{\pi}{2}}^{\pi} \frac{\sin x}{e + \cos x} dx$

12.  $\int_{\ln 3}^{\ln 8} \frac{e^x}{\sqrt{1+e^x}} dx$     13.  $\int \tan(3x) dx$     14.  $\int_2^3 \frac{1}{5-4x} dx$

15.  $\int_{-3}^{-1} \frac{1-x}{x^2} dx$     16.  $\int_0^{\ln 3} \frac{e^{2x}}{1+e^{2x}} dx$     17.  $\int \frac{(1+e^{3x})^2}{e^{3x}} dx$

18. Find the function  $f(x)$  that satisfies  $f'(x) = \frac{1}{e^{2x}(1-2e^{-2x})^2}$  and  $f(0) = -1$

**Tangent Lines**

19. Find the equation of the tangent line to the curve

$y = \cos(\ln(x+1)) + \ln(\cos x) + e^{\sin x} + \sin(e^x - 1)$  at the point where  $x = 0$ .

20. Find the equation of the tangent line to the curve  $f(x) = \frac{1}{e^{2x}}$  at the point where  $x = \ln 3$

# REGULAR OFFICE HOURS

**Monday: 1:00–3:00 pm**

**Tuesday: 12:00–4:00 pm**

7:30–9:00 pm TA Bobby, SMUDD 205

**Wednesday: 1:00-3:00 pm**

**Thursday: none for Professor**

7:30–9:00 pm TA Bobby, SMUDD 205

**Friday: 12:00–2:00 pm**

- Maintain an hour a day preparation for the last two exams.