

HOMEWORK #20 Review Packet for Exam #3**Due Wednesday, April 24th** in Gradescope by 11:59 pm**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. Compute $g'(e^4)$, where $g(x) = \sqrt{\ln x} + \ln \sqrt{x}$. Simplify.

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: 12:00–3:00 pm

Tuesday: 1:00–4:00 pm

7:30–9:00 pm TA Alexa, SMUDD **208a**

Wednesday: 1:00-3:00 pm

Thursday: none for Professor

6:00–7:30 pm TA Alexa, SMUDD **208a**

Friday: 12:00–2:00 pm

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