HOMEWORK #20   Review Packet for Exam #3

==**Due Friday, April 18th** in Gradescope by 11:59 pm==

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

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

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

3. $y = \ln\left(\dfrac{(x^2+1)^{\frac{4}{7}}\, e^{\tan x}}{\sqrt{1+\sqrt{x}}}\right)$ 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. $f(x) = \dfrac{1}{e^{\sin x}} + \dfrac{e}{\sin\left(e^x\right)}$

7. Compute $g'\left(e^4\right)$, where $g(x) = \sqrt{\ln x} + \ln\sqrt{x}$. Simplify.

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

Integration   Compute each of the following integrals.

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

12. $\displaystyle\int_{\ln 3}^{\ln 8} \dfrac{e^x}{\sqrt{1+e^x}}\, dx$ 13. $\displaystyle\int \tan(3x)\, dx$ 14. $\displaystyle\int_{2}^{3} \dfrac{1}{5-4x}\, dx$

15. $\displaystyle\int_{-3}^{-1} \dfrac{1-x}{x^2}\, dx$ 16. $\displaystyle\int_{0}^{\ln 3} \dfrac{e^{2x}}{1+e^{2x}}\, dx$ 17. $\displaystyle\int \dfrac{(1+e^{3x})^2}{e^{3x}}\, dx$

18. Find the function $f(x)$ that satisfies $f'(x) = \dfrac{1}{e^{2x}\left(1-2e^{-2x}\right)^2}$ 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 $f(x) = \dfrac{1}{e^{2x}}$ 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 Andrew, SMUDD 207

Wednesday: 1:00-3:00 pm

Thursday: none for Professor

8:00–9:30 pm TA Andrew, SMUDD 208A

Friday: 12:00–2:00 pm

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