

Homework #18

Due Friday April 14th in Gradescope by 11:59 pm ET

Goal: Solidify Calculus for Exponentials and Algebra for early Logarithms

1. Consider $f(x) = e^x + \frac{1}{e^x} + x^e + \frac{1}{x^e} + \frac{x}{e} + e + \frac{e}{x^2} + ex + \frac{1}{e^3x^3}$.

(a) Compute $f'(x)$. (b) Compute $\int f(x) dx$.

2. Consider $f(x) = e^{7x} + \frac{1}{7e^{7x}} + e^7 + \frac{7}{e^x} + \frac{7}{e^7} + e^{7-x} + \frac{1}{e^{7-x}} + e^{\sqrt{7-x}}$. Compute $f'(x)$.

3. Consider $f(x) = e^{\tan x} + \frac{1}{e^{\sec x}}$. Compute $f'(x)$.

4. Consider $f(x) = \frac{1}{e^{\tan x}} + \sec(e^x)$. Compute $f'(x)$.

5. Consider $f(x) = \cos \sqrt{e^x + e^7} + e^{\sqrt{7x+7} \cos x} + \sqrt{e^{7x} - \sin x}$. Compute $f'(x)$.

6. Consider $f(x) = \frac{1}{e^{\sqrt{7x+7} \sin x}} + \frac{1}{\sqrt{e^{7x} - \sin x}}$. Compute $f'(x)$.

Compute each of the following integrals:

7. $\int \frac{1}{\sqrt{x} e^{1+\sqrt{x}}} dx$ 8. $\int \frac{(1+e^{3x})^2}{e^{3x}} dx$ 9. $\int \frac{e^{3x}}{(1+e^{3x})^2} dx$

10. $\int \frac{1}{e^{3x}(1+e^{-3x})^6} dx$ 11. $\int e^{3x}(1+e^{3x})^6 dx$ 12. $\int \left(e^{3x} + \frac{1}{e^{2x}} \right) \left(1 + \frac{1}{e^{4x}} \right) dx$

13. Find $f(x)$ if $f''(x) = 3e^x + 5 \sin x$ and $f(0) = 1$ and $f'(0) = 2$

Simplify each of the following values:

14. $\ln 1$ 15. $\ln e$ 16. $\ln e^5$ 17. $e^{\ln 6}$ 18. $e^{2 \ln 6}$ 19. $e^{-4 \ln 2}$ 20. $\ln \left(\ln e^{(e^{10})} \right)$

Solve each of the following:

21. $e^{7-4x} = 6$

22. $\ln(3x - 10) = 2$

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

- To be a beast, train like a beast!