Math 106, Spring 2022

Worksheet 9, Tuesday, April 19th, 20122

Differentiation

1. Compute $g''(x)$ when $g(x) = \displaystyle\int_x^7 \sqrt{e^t + 3}\, dt$. Simplify.

2. Compute $f'(x)$ where $f(x) = \sqrt{\cos(x^2 + e^x)} + \cos\sqrt{x^2 + e^x} + e^{\sqrt{x^2+\cos x}}$.

3. Suppose that $e^{\sin y} = 2 - xy$. Compute the derivative $\dfrac{dy}{dx}$.

4. Differentiate $f(x) = \dfrac{1 + e^{-2x}}{1 - e^{7x}}$. Simplify.

Integration Compute each of the following integrals.

5. $\displaystyle\int e^x \left(1 + e^x\right)^2\, dx$

6. $\displaystyle\int \frac{(1 + e^x)^2}{e^x}\, dx$

7. $\displaystyle\int (e^x + e^{-x})(e^x - e^{-x})\, dx$ 2 ways?

8. $\displaystyle\int (e^{4x} + e^{-9x})^2\, dx$

9. $\displaystyle\int \frac{\sqrt{1 + e^{-3x}}}{e^{3x}}\, dx$

10. $\displaystyle\int \frac{e^{\frac{1}{x}}}{x^2}\, dx$

11. $\displaystyle\int \cos x \cdot e^{5+\sin x}\, dx$

12. Compute the area bounded between $y = e^x$, $y = x$ and $x = -1$ to $x = 4$. Sketch and shade the described bounded region.

13. Differentiate $f(x) = \ln\left(\cos x + \sqrt{x}\right)$

14. Compute $\displaystyle\int_0^{\ln 5} \frac{1}{e^{2x}}\, dx$

15. Compute $\displaystyle\int_e^{e^2} \frac{1}{x(\ln x)^2}\, dx$

16. Find the function $f(x)$ that satisfies $f'(x) = \dfrac{e^{\sqrt{\tan x}} \sec^2 x}{\sqrt{\tan x}}$ and $f\left(\dfrac{\pi}{4}\right) = 1$.

Turn in your own solutions.