

Worksheet 9, Tuesday, April 11th, 2023

Differentiation

1. Compute $g''(x)$ when $g(x) = \int_x^7 \sqrt{e^t + 3} dt$. 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. Differentiate $f(x) = \frac{1 + e^{-2x}}{1 - e^{7x}}$. Simplify.

Integration Compute each of the following integrals.

4. $\int e^x (1 + e^x)^2 dx$
5. $\int \frac{(1 + e^x)^2}{e^x} dx$
6. $\int (e^x + e^{-x})(e^x - e^{-x}) dx$ 2 ways?
7. $\int (e^{4x} + e^{-9x})^2 dx$
8. $\int \frac{\sqrt{1 + e^{-3x}}}{e^{3x}} dx$
9. $\int \frac{e^{\frac{1}{x}}}{x^2} dx$
10. $\int \cos x \cdot e^{5 + \sin x} dx$
11. $\int e^{8x} + e^x + \frac{1}{e^x} + \frac{1}{e^{8x}} dx$
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. Find the function $f(x)$ that satisfies $f'(x) = \frac{e^{3x}}{\sqrt{8 + e^{3x}}}$ and $f(0) = -4$.
14. Find the function $f(x)$ that satisfies $f'(x) = \frac{x^2}{e^{(x^3)}}$ and $f(2) = \frac{1}{e^8}$.
15. Find the function $f(x)$ that satisfies $f'(x) = \frac{e^{\sqrt{\tan x}} \sec^2 x}{\sqrt{\tan x}}$ and $f\left(\frac{\pi}{4}\right) = 1$.

Turn in your own solutions.