Derivatives of Exponential and Logarithm Functions

Differentiate each of the following functions.

1. \( f(w) = 4e^w \ln(w) \).

2. \( h(t) = \frac{t^2}{1 - \ln(t)} \).

Inverse Trig Functions

Differentiate each of the following function.

3. \( V(t) = \sin(t) - t^2 \sin^{-1}(t) \)

4. \( y = 6 \cos^{-1}(z) - \tan^{-1}(z) \)

Chain Rule

For problems 5 – 9 differentiate the given function.

5. \( g(z) = \sqrt[3]{4z + 2 \ln(z^2 - \sin(z))} \)

6. \( R(t) = e^{-t} \sec^3(t) \)

7. \( y = \frac{\cos(3x)}{x - \cos(1 - x)} \)

8. \( f(w) = \tan(e^{4w^2} - \ln(5w)) \)

9. \( T(x) = \sqrt{10x - \sin^3(4x)} \)

10. Determine where \( f(z) = 1 - z - \ln(z^2 + 3z + 3) \) is increasing and decreasing.

11. Determine where in [-30, 30] the function \( f(x) = 3x - 4 \cos \left( \frac{x}{2} \right) \) is increasing and decreasing.

12. Determine where \( h(t) = 4e^{1-t^2} + e^{5-t^2} \) is not changing.