Derivatives of Exponential and Logarithm Functions
Differentiate each of the following functions.
1. \( Q(w) = \frac{\ln(w)}{2w^5} \)
2. \( g(z) = 12 \ln(z) - 5z^3e^z \)

Inverse Trig Functions
Differentiate each of the following function.
3. \( f(y) = \tan^{-1}(y) + y^2 \sin^{-1}(y) \)
4. \( y = \cos(x) \cos^{-1}(x) \)

Chain Rule
For problems 5 – 9 differentiate the given function.
5. \( U(t) = 6 \sec^4(t) - \csc(7t) \)
6. \( g(x) = \sqrt{7+3x} \cos(2-x) \)
7. \( y = \frac{e^{3t}}{6t - \sin(4t)} \)
8. \( h(y) = \left[ \sqrt{11y + \ln(3y - \tan(y))} \right]^4 \)
9. \( f(x) = \cot^5 \left( 7x + e^{\sin(5x)} \right) \)

10. Determine where \( y = \ln \left( 2w^4 - w^3 - 3w^2 + 25 \right) \) is not changing.

11. Determine where in \([-20, 40]\) the function \( f(x) = 6x + 12 \sin \left( \frac{x}{4} \right) \) is increasing and decreasing?

12. Determine where \( h(t) = -2t^2 e^{4-t^2} \) is increasing and decreasing.