**Differentiation Formulas**

1. Differentiate: \( h(t) = 10t^9 - \frac{2}{\sqrt[3]{t^3}} + \frac{1}{9t^2} - 12 \)

2. Find the equation of the tangent line to \( g(x) = x^4(15x - 2x^{-3}) \) at \( x = -2 \).

3. Find the point(s) where the tangent lines to \( f(x) = x^3 + 7x^2 - 2x + 14 \) and \( g(x) = 5 - x - 4x^2 \) will be parallel.

4. The position function of an object is \( s(t) = 2t^3 - 51t^2 + 360t + 60 \) where \( t \) is in seconds and \( s \) is in feet. Assume that the object starts moving at \( t = 0 \) and answer the following questions.
   \( \text{(a)} \) What is the velocity of the object at any time \( t \)?
   \( \text{(b)} \) When, if ever, is the object at rest (\( i.e. \) not moving)?
   \( \text{(c)} \) When is the object moving to the right and when is it moving to the left?

5. What percentage of the range \([-8, 4]\) is \( f(w) = w^4 + 3w^3 - 22w^2 + 2 \) decreasing?

**Product and Quotient Rule**

For problems 6 & 7 use the Product or Quotient Rule to find the derivative.

6. \( R(z) = (2\sqrt{z} + 3)(\frac{3}{2}z^\frac{3}{2} - \sqrt{z^3}) \)

7. \( f(x) = \frac{1 - 6x}{10 - x + 3x^2} \)

8. Determine where the function \( V(t) = \frac{t^2}{2t^3 - 3t + 4} \) is not changing.

**Derivative of Trig Functions**

For problems 9 – 11 differentiate the given function.

9. \( g(t) = 4 \sec(t) - 8 \csc(t) + t \sin(t) \)

10. \( y = \frac{5 + \tan(x)}{3 - \cot(x)} \)

11. \( h(\theta) = 3 \cos(\theta) \sin(\theta) - \theta^4 \sec \theta \)

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12. Find the equation of the tangent line to \( y = \frac{3}{1 - \cos(x)} \) at \( x = \pi \).

13. The population of fish (in hundreds) in a lake is given by \( P(t) = 7t + 12 \sin(t) + 1 \) where \( t \) is in years. When in the first 180 months is the population not changing?