1. Differentiate the function \( g(x) = 6x^9 - 3x^4 + 6 \).

2. Differentiate the function \( f(t) = \frac{1}{2}t^4 - 4t^3 + \frac{1}{4}t \). 

3. Differentiate the function \( R(t) = 3t^{\frac{2}{3}} \). 

4. For \( f(x) = 10x + \frac{1}{x} \) find \( f'(x) \). 

5. For what values of \( x \) does the graph of \( f(x) = x^3 + 3x^2 + x + 3 \) have a horizontal tangent? 

6. At what point on the curve \( y = 1 + 4e^x - 2x \) is the tangent line parallel to the line \( 6x - y = 1 \)? 

7. Find the equations of both lines through the point \((-1, -5)\) that are tangent to the parabola \( y = x^2 - 3x \). 

8. Differentiate \( y = \frac{e^x}{9 + 11x} \).
9. Differentiate \( Y = \frac{4x - 7}{5x + 8} \).

10. Differentiate.

\[ R(t) = (t + 5e^t)(1 - 7\sqrt{t}) \]

11. Differentiate \( Y = \frac{9t^2}{8t^2 - 4t + 7} \).


\[ Y(t) = \frac{1}{t + ke^t} \]

13. Differentiate \( f(x) = \frac{a x + b}{c x + d} \).

14. Find the equation of the tangent line to the given curve at the specified point.

\( \overline{v} = 4xe^x \), (0, 0)

\( v = \) __________ ?

15. If \( f(4) = 7 \), \( g(4) = 5 \), \( f'(4) = -3 \), and \( g'(4) = 4 \), find the following numbers.

(a) Find \( (f + g)'(4) \).

\( (f + g)'(4) = \) __________
(b) Find \((fg)'(4)\).

\((fg)'(4) = \underline{\phantom{000}}\) 

(c) Find \(\left(\frac{f}{g}\right)'(4)\).

\(\left(\frac{f}{g}\right)'(4) = \underline{\phantom{000}}\)

(d) Find \(\left(\frac{f}{f - g}\right)'(4)\).

\(\left(\frac{f}{f - g}\right)'(4) = \underline{\phantom{000}}\)

16. Differentiate \(f(x) = x \cos x\).

17. Differentiate the function \(y = e^u(3 \sin u + 2u)\) with respect to \(u\).

18. Differentiate \(y(x) = \frac{1 + \cos x}{x - \sin x}\).

19. Differentiate \(y = \sec \theta(\tan \theta - \theta)\).
20. Differentiate \( y = x \sin x \cos x \).