1. \( f'(x) \) for each of the following

(a) \( f(x) = \frac{1}{\sqrt{x}} \)

(b) \( f(x) = \frac{1}{3x^2 + 25} \)

(c) \( f(x) = x^2 - \frac{1}{x} \)

(d) \( f(x) = \frac{x + 2}{x - 3} \)

(e) \( f(x) = \frac{4x + 3\sqrt{x}}{x^2 + 1} \)

2. (a) Find the points where the curve \( y = 6x - 10x^2 + 3x^3 \) has slope 2.

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

3. Show that the curve \( y = 6x + 3x^2 + x^3 \) has positive slope everywhere.

4. Find the equation of the tangent line to the curve \( y = \frac{x}{1 + x^2} \) at the point \((-1, -\frac{1}{2})\)

5. Suppose that \( f(5) = 1, f'(5) = 6, g(5) = -3, \) and \( g'(5) = 2 \). Find \((f + g)'(5), (fg)'(5),\) and \((f/g)'(5)\).

6. Find the derivative of the function

\[ F(x) = \frac{x - 3x\sqrt{x}}{\sqrt{x}} \]

in two ways: by using the Quotient Rule and by simplifying first. Show that your answers are equivalent.

7. Find the equation of the tangent line to the curve \( y = x\sqrt{x^2 - 1} \) at \((2, 2\sqrt{3})\).

8. The position of a particle moving on the x-axis is given by

\[ x = t^3 - 6t^2 + 15t - 5, \]

where \( x \) is in feet and \( t \) is in seconds. How far is this particle from the origin when the velocity is 3 ft/sec.

9. If \( f(x) = x(x + 1)(x + 2)(x + 3)(x + 4) \), then find \( f'(0) \).

10. Approximate \( \sqrt[3]{997} \) using linear approximation.