1. If \( g(x) = \ln(3x^4 + 5x) \), find \( g'(x) \).

2. Find the slope of the tangent line to the curve \( x^3 + y^3 - \frac{9}{2}xy = 0 \) at (2,1).

3. Find the intervals where the function \( f(x) = \frac{x - 1}{x^2 + 3} \) is increasing and decreasing. Find all horizontal and vertical asymptotes of this function.

4. Find \( \lim_{x \to 0} \frac{1 - \cos x}{\sec x} \).

5. Let \( f(x) = \sqrt{2 + 7x^3} \).
   a. Compute \( f(1) \).
   b. Compute \( f'(1) \).
   c. Using the differential or tangent line approximation, find an approximate value for \( f(1.08) \).

6. Find \( \lim_{x \to 0^+} x \ln x \).

7. Find the absolute extrema of \( f(x) = x^{2/3}(5 - 2x) \) on the interval \([-1, 2]\).

8. A farmer wishes to fence in a rectangular field containing an area of 600 square meters. If the field has a fence down the middle parallel to one side, what is the smallest amount of fencing that he can use?
9. A person 6 ft tall stands 10 ft from point P directly beneath a lantern hanging 30 ft above the ground, as shown in the figure below. The lantern starts to fall, causing the person’s shadow to lengthen. Given that the lantern falls $16t^2$ ft in $t$ seconds, how fast will the shadow be lengthening when $t = 1$?