1. Find the center and radius of the circle with equation
   \[ x^2 + y^2 + 8x - 10y - 40 = 0. \]

2. If \( f(x) = \frac{x - 9}{x + 2} \), write the domain of \( f \) in interval notation.

3. Find equations for the asymptotes to the graph of \( f(x) = \frac{3x^2 - 5x - 2}{x^2 + 4x - 8} \).
   \[ \text{Vertical: } \quad \text{Horizontal: } \]

4. Let \( f(x) = x^2 - 6x + 3 \). Given that \( f'(x) = 2x - 6 \), find the slope-intercept form for the tangent line to the graph of \( f \) which is perpendicular to the line \( 2x + 8y = 7 \).

5. Find the following limits, or show that they do not exist:
   \[ \begin{align*}
   a) \quad & \lim_{x \to 4} \frac{\sqrt{x + 5} - 3}{x - 4} \\
   b) \quad & \lim_{x \to 5} \frac{\frac{1}{x^2} - \frac{1}{25}}{x - 5} \\
   c) \quad & \lim_{x \to -2} \frac{x^3 + 8}{x^2 + 8x + 12} \\
   d) \quad & \lim_{x \to 3^-} \frac{|10x - 30|}{x^2 - 8x + 15}
   \end{align*} \]

6. Use the definition of the derivative as a limit to find \( f'(x) \) for \( f(x) = \frac{1}{x^2 + 8} \).

7. Let \( f(x) = \begin{cases} 
      5x + k^2, & \text{if } x < 2 \\
      8k + 3, & \text{if } x = 2 \\
      kx + 45, & \text{if } x > 2,
   \end{cases} \)
   a) Find all values of \( k \) for which \( \lim_{x \to 2} f(x) \) exists.
   b) Find all values of \( k \) for which \( f \) is continuous at 2 (or show that there are no such values).

8. Find \( \lim_{x \to \infty} \frac{5 - 6x}{\sqrt{4x^2 + x + 1}} \).

9. Use the definition of the derivative as a limit to find the slope of the tangent line to the graph of \( f(x) = \frac{5x - 7}{(2x - 1)^2} \) at \((2, \frac{1}{3})\).

10. If the cost to mail a package by media mail is $2.53 for the first pound and $0.45 for each additional pound (or fraction thereof), use the greatest integer function to write a single formula for \( C(x) \), the cost of mailing a package weighing \( x \) pounds (for \( x > 0 \)).