1. Solve the following systems of equations.
   (a) \[
   \begin{cases}
   x^2y = 20 \\
   x^2 + y = 9
   \end{cases}
   \]
   (b) \[
   \begin{cases}
   7x^2 + 8y = -5 \\
   4x^2 + 3y = 16
   \end{cases}
   \]

2. Solve the following equations.
   (a) \(|-8x - 9| \geq 7\)
   (b) \(\sqrt{4 - 3x - x^2} = 8\)

3. Find the domains of the following functions.
   (a) \(\sqrt{6x^2 + x - 1} \sin^{-1}x\)
   (b) \(\frac{\log(-3x + 8)}{\sqrt{x^2 + 3x - 28}}\)

4. Find the average rate of change of the function \(f(x) = -3x^2 - x + 4\) from \(x = -2\) to \(x = 3\).

5. Consider the quadratic function \(f(x) = 3x^2 + 4x - 1\).
   (a) What is the vertex of this parabola?
   (b) What are the \(x\)-intercepts of this function?

6. For the functions \(f(x) = \frac{x}{x - 3}\) and \(g(x) = \frac{5}{x - 1}\), find \((f \circ g)(x)\).

7. Find the inverse of the function \(f(x) = \frac{x - 2}{x + 1}\).

8. How would the graph of \(g(x) = -\frac{1}{2}f(x - 3) + 6\) be obtained from the graph of \(f\)?

9. Find any asymptotes, intercepts, and holes for the rational function \(r(x) = \frac{9x^2 - 25}{(3x^2 - 11x + 10)(x + 4)}\).

10. Consider the polynomial \(P(x) = -3x^3 + 2x^2 + 12x - 8\).
    (a) Find the zeros of this polynomial.
    (b) Find the quotient and remainder when \(P(x)\) is divided by \(x^2 - 2x + 3\).

11. Perform the multiplication and write in standard form: \((8 - \sqrt{-25})(-3 + \sqrt{-4})\)

12. Solve the following equations.
    (a) \(3 \cdot 5^{x-2} = 8\)
    (b) \(\log_{100} x + \log_{100}(3x - 13) = \frac{1}{2}\)
13. Rewrite the following expression as a single logarithm:
\[
\frac{1}{3} \log p^2 - \frac{3}{4} \log 16p^4 - \frac{2}{3} \log 8(p^3 + 27)
\]

14. Find the exact value of the indicated part of the triangle from the given information.
   
   (a) Given: \( C = 30^\circ, \ B = \frac{3\pi}{4}, \ b = 5; \) Find the exact value of \( c. \)
   
   (b) Given: \( A = 120^\circ, \ b = 3, \ c = 5; \) Find the exact value of \( a. \)

15. Given that \( \tan x = \frac{1}{3} \) with \( x \) in Quadrant III and that \( \cot y = -\frac{3}{2} \) with \( y \) in Quadrant II, find the exact values of the following:
   
   (a) \( \csc x \)
   
   (b) \( \sin 2y \)
   
   (c) \( \cos(x - y) \)

16. Find the exact value of \( \sin(\cos^{-1} \frac{2}{3} + \tan^{-1} \frac{4}{5}). \)

17. Find all solutions to the equation \((2 \sin \frac{x}{4} + \sqrt{3})(\sqrt{2} \cos 6x - 1) = 0.\)

18. Two forces are acting on an object. The first force has a magnitude of 10 pounds and is applied in the direction \( 30^\circ. \) The second force is given by the vector \( \mathbf{F}_2 = -3 \mathbf{j}. \) What is the total resulting force? What is its magnitude and direction?

19. A vector \( \mathbf{u} \) has initial point \((-3, 6)\) and terminal point \((-1, 7)\). A second vector \( \mathbf{v} \) has magnitude \( \sqrt{10}, \) a vertical component of 1, and has a direction \( \theta \) where \( \tan \theta < 0. \)
   
   (a) Find \( \mathbf{u} \cdot \mathbf{v} \)
   
   (b) What is the angle between \( \mathbf{u} \) and \( \mathbf{v} ? \)

20. Determine whether the following represent a parabola, ellipse, or hyperbola by writing the equation in standard form. What is the center of the conic?
   
   (a) \( x^2 - 6x - 4y^2 - 40y - 95 = 0 \)
   
   (b) \( x^2 + 6(y - 7)^2 = 36 \)