1. Find the domain for the function \( f(x) = \frac{\sqrt{6-3x}}{x+4} \).

2. Find an equation for the line through the point \((-1, 4)\) and perpendicular to the line \(4x + 3y = 9\).

3. Find the exact value of \( \log_3 \left( \frac{1}{27} + (16)^{-3} \right) \).

4. Find the term involving \( x^4 \) in the expansion of \( (\frac{4}{3} - 3y)^7 \).
4. Express \( \frac{2+i}{3-2i} \) in the form \( a + bi \), where \( a \) and \( b \) are two real numbers.

5. Solve the inequality \(|2x + 5| \geq 3\). Graph the answer on the number line.

6. Find the center and radius of the circle \( x^2 + y^2 + 6x - 4y - 12 = 0 \). Sketch the circle.

7. Find the term involving \( x^4 \) in the expansion of \( \left( \frac{x^2}{3} - 3y \right)^7 \).
8. If $\theta$ is in the second quadrant and $\tan \theta = -\frac{3}{4}$, find $\sin \theta$ and $\cos 2\theta$.

9. Sketch the graph of $y = -3\sin 2x$ from $x = 0$ to $x = 2\pi$. Indicate all intercepts and its amplitude.

10. Sketch the graph for $y = -x^2 - 2x + 3$. Indicate the vertex, x- and y- intercepts.
PART II: Do any FIVE of the problems 11-17. Each is worth 10 points.

11. Let $f(x) = 5x - 4$ and $g(x) = \frac{2x}{x+3}$. Find:
   (a) $(g \circ f)(x)$  
   (b) $(f \circ g)(2)$  
   (c) $f^{-1}(x)$  
   (d) $g^{-1}(x)$

12. (a) Solve the inequality $\frac{x-1}{x+3} \leq 0$.

   (b) Solve the equation $\log_4(x + 5) + \log_4(x - 1) = 2$ and check your answers.
13. (a) Let \( f(x) = x^2 + 3 \). Simplify \( \frac{f(x+h)-f(x)}{h} \).

(b) Use the Rational Root Theorem to list all possible rational roots of the equation \( 2x^3 - x^2 + 6x - 3 = 0 \), and then find all roots (real or complex) of the equation. (Hint: One of the roots is a positive rational.)
14. (a) Find the exact value of $\tan(\arccos(-\frac{5}{13}))$.

(b) Find the center, vertices and foci of the ellipse:

$$\frac{(x - 2)^2}{25} + \frac{(y + 3)^2}{9} = 1$$

Sketch the ellipse.
15. (a) Solve the equation $\sqrt{4x+1} - x = 1$ and check your answers.

(b) Let $f(x) = \frac{2x+3}{x-1}$. Find the vertical and horizontal asymptotes, x- and y-intercepts, and sketch the graph.
16. (a) Solve the equation \(5^{x^2 - 1} = 25^{x + 1}\).

(b) Verify the identity \(\tan \theta + \cot \theta = \frac{2}{\sin 2\theta}\).

17. (a) Find an equation for the circle taking the line segment between two points \(P(-4, -1)\) and \(Q(2, 7)\) as a diameter.

(b) Find \(\cos(A + B)\) if \(A\) is in the second quadrant with \(\sin A = \frac{3}{5}\) and \(B\) is in the first quadrant with \(\cos B = \frac{12}{13}\).